THE EXTRA PHARMACOPŒIA

MARTINDALE
AND
WESTCOTT

VOL. I

TWENTIETH EDITION
REVISED BY
W. H. MARTINDALE

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THE EXTRA PHARMACOPŒIA OF Martindale and Westcott

REVISED

BY

W. Harrison Martindale,

Ph.D., Ph.Ch., F.C.S.

TWENTIETH EDITION.

IN TWO VOLUMES

VOL. I.

LONDON:

H. K. LEWIS & Co., LTD.

1932.

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PREVIOUS EDITIONS OF THE EXTRA PHARMACOPŒIA.

		No. of Pages (*excluding Introductory*)
1*st Edition published*	1883	313
2*nd* ,, ,, ...	1884	330
3*rd* ,, ,, ...	1884	330
4*th* ,, ,, ...	1885	446
5*th* ,, ,, ...	1888	462
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7*th* ,, ,, ...	1892	524
8*th* ,, ,, ...	1895	580
9*th* ,, ,, ...	1898	626
10*th* ,, ,, ...	1901	688
11*th* ,, ,, ...	1904	809
12*th* ,, ,, ...	1906	1075
13*th* ,, ,, ...	1908	1203
14*th* ,, ,, ...	1910	1054
Supplement : Organic Analysis Chart...	1910	80
15*th Edition, Vol. I published*	1912	1112
15*th* ,, ,, *II* ,, ...	1912	370
16*th* ,, ,, *I* ,, ...	1915	1113
16*th* ,, ,, *II* ,, ...	1915	469
16*th* ,, *Reprint (both Vols.)* ...	1918	
16*th* ,, ,, ,, ,, ...	1920	
17*th* ,, *Vol. I published*	1920	1115
17*th* ,, ,, *II* ,, ...	1921	688
17*th* ,, *Reprint (Vol. I)*	1922	1122
18*th* ,, *Vol. I published*	1924	1163
18*th* ,, ,, *II* ,, ...	1925	728
19*th* ,, *Vol. I published*	1928	1207
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PREFACE.

The nineteenth edition of the First Volume of THE EXTRA PHARMACOPŒIA was issued in June, 1928, followed by the Second Volume in October, 1929.

Since then several NATIONAL PHARMACOPŒIAS have been published and to these reference has been made in revising our pages. We would mention in this connection—FARMACOPEA UFFICIALE DEL REGNO D'ITALIA, quinta edizione, 1929; PHARMACOPÉE BELGE, quatrième édition, 1930; and FARMACOPEA OFICIAL ESPAÑOLA, octava edición, 1930.

With regard to the BRITISH PHARMACOPŒIA, 1932, we have followed with interest the various Pharmacopœia Commission Reports of Sub-Committees printed from time to time during the last two years by the General Medical Council. We have prepared abstracts from these and have conducted independent research work in our laboratories on chemical and pharmaceutical points arising from their study, and, we may add, on several occasions have made suggestions to members of one of these Committees which occurred to us as helpful.

We prefer, for example, the metric cubic centimetre, and its well-known contraction the Cc., in contradistinction to the millilitre and its abbreviation 'mil.' The United States Pharmacopœia, it will be recalled, tried 'mils' for an edition but reverted to the more universally accepted cubic centimetre. In addition to this, Gm. is considered the best contraction for Gramme.

So far as weights and measures in general for medicinal purposes are concerned, it is doubtful whether perpetuation of the dual system (Imperial and Metric) has any special advantages—*vide* Weights and Measures *postea*.

It is perhaps not in order to give a detailed criticism of the changes in the BRITISH PHARMACOPŒIA, but one cannot help remarking (pharmacists would agree) that the requirements in the Official work, both as to the making and assaying of preparations, should be as simple and convenient as possible. The pharmacist's work should be *reduced*, rather than increased by complicated processes.

Criticism will no doubt be forthcoming for some time so we must restrain the pen—much as we should like to digress on the subject. One small instance of labour-saving we must however mention, namely, we proved a few years ago that in many cases maceration of drugs was as effectual as percolation. The result in the case of an investigation of Tincture of Digitalis—confirmed by Bio-Assay—was remarkable—*v. p.* 390.

With these considerations before us it was thought best to arrange the Principal Additions and Changes to be effected in the *B.P.* '32 in the form of a Synopsis, as was done on similar occasions in connection with the *B.P.* '85, '98 and '14. We trust the arrangement will be found convenient. It enables those using the BRITISH

PHARMACOPŒIA in their work to note quickly the alterations that have been made and to compare information that has been brought into our own pages during the last five decades and especially in recent years.

Whilst in the body of the work we retain references to a number of *B.P.* '14 preparations, we have included with the contraction '*P. Off.*' (*i.e.*, Proposed Officially by the Pharmacopœia Commission Reports) on occasion, the proposed recommendations, and the Synopsis gives *in précis* remarks upon strengths, doses, etc., as laid down in the new Official work.

Further, it is certain that many of the *B.P.* '14 drugs, preparations, etc., now omitted from the *B.P.* will continue to be in favour and are therefore referred to in our pages.

International Unification of Potent Remedies has been secured in some degree. The position regarding this Unification is as follows:

An International Conference met at Brussels in 1902 and a Second Conference in 1925. The salient points arising from the Agreements decided upon we recorded, by means of the abbreviations 'F.I.' and 'F.I. Second,' in past editions of the book.

International agreement regarding medicinal preparations, many of them handed down for centuries in separate countries, is naturally difficult and will be a slow development.

Twenty-six States were represented at the 1925 meeting and a draft International document, embodying the decisions reached was submitted to the various governments for ratification. (The Conference also appointed two Commissions—one to deal with Chemical and Physico-chemical Assay Methods and the other to study methods of making potent galenical preparations. The decisions reached by these Commissions may be introduced in Supplements to Pharmacopœias now in operation.)

The Belgian Pharmacopœia Commission has taken important steps in the general question of unification of National Pharmacopœias and one wishes it success in reaching the useful desideratum.

The Governments of the following countries signed the Second International Agreement on August 20, 1929:—Belgium, Greece, Latvia, Roumania and the Kingdom of the Serbs, Croats and Slovenes.

The following countries signed with certain reservations:—Bulgaria, Denmark, Egypt, France, Italy, the Netherlands, Norway, Sweden and Switzerland.

The British Government has not yet signed the Agreement, but will do so at a later date (with reservations). In notifying adhesion to the Agreement Great Britain reserved the right to introduce modifications in detail rendered expedient by established usage and progress in medical and pharmaceutical science. The letters I.A. therefore appear in *B.P.* '32, after the following subsidiary headings:—

Aconiti Tuber, Cocaini Hydrochloridum, Extractum Opii Aquosum, Lobeliæ Herba, Pulvis Opii et Ipecacuanhæ Compositus, Scillæ Bulbus, Secale Cornutum, Solutio Arsenicalis seu Fowleri, Solutio Nitroglycerini Spirituosa, Strychni Semen, Sirupus Ferrosi Iodidi Concentratus, Tinctura Opii Benzoica.

So far as *liaison* between the B.P. and the U.S.P. authorities is concerned, obviously good should accrue, but in actual practice a complete understanding as to interchangeable potent preparations in the countries of Europe would be useful to the Profession on both sides of the Channel if it could be attained.

Certainly the pharmacist at home sees relatively few U.S. prescriptions, while those of France, Germany, Switzerland and the rest of Europe are frequent arrivals and they are often puzzling owing to absence of conformity. It is in fact only with the aid of National Pharmacopœias at hand or information embodied in our own pages that the exact wishes of the prescriber can be arrived at in some instances when dispensing foreign prescriptions, or indeed can safety be assured.

Nomenclature (even Latinised) is bound to offer difficulties in unification owing to local usage, thus to point to but a single instance —Liquor Arsenicalis, Fowler's Solution, of universal reputation during the last two centuries, has the following divers Latin designations in the recently completed Pharmacopœias :

KALIUM ARSENICOSUM SOLUTUM in P. Ital. V.
ARSENICALIS SOLUTIO FOWLERI in P. Belg. IV.
SOLUTIO ARSENITIS POTASSII in F. Espan. VIII.

followed in the last two by the International designation SOLUTIO ARSENICALIS SEU FOWLERI. Add to these the fact that the U.S.P. designates the solution LIQUOR POTASSII ARSENITIS.

Numerous examples of other kinds of unfortunate International lack of uniformity were given in the preface of the last edition.

We would draw attention to some of the *New Remedies*, and *new methods* of using *old ones*, incorporated in the EXTRA PHARMACOPŒIA, in sequence, according to the pages on which they are to be found.

Acidum Carbolicum.—Carbolised Almond Oil (5% strength) for the injection treatment of hæmorrhoids is new, and its use has resulted in discussion by surgeons—*v. p.* 16.

Acidum Cresylicum.—Research has been actively conducted in regard to **Cresylic Disinfectants.** The opinion has been expressed that in respect of antiseptics in midwifery no Lysol can be other than a delusion, as it is only active on Gram-negative organisms. This is a sweeping condemnation. Lysol was under consideration by the Central Midwives Board and the L.C.C. The Board continues its use providing it contains 50% Cresols—*v. p.* 28.

Amyl-meta-cresol is a powerful antiseptic of low toxicity offering hope of utility as a urinary antiseptic.

Acidum Salicylicum.—This Chapter contains an extended review of the use of Sodium Salicylate as a sclerosing agent for dealing with varicose veins. A number of surgeons have written favourably concerning it, especially in conjunction with Sodium Chloride. According to an authority on the matter (B.M.J. i./32,1054), the Sodium Salicylate method with addition of 1% Novocain is deemed 'the technique of choice which will solve all problems.'

'Twin' injections, combining Lithium Salicylate with Quinine

and Urethane have been well spoken of, resulting in a deposition of Quinine Salicylate. We would refer to *pp.* 63-66 for a chronological account of the matter covering the work of the last three or four years. By a slip the three lines embodying the recent reference B.M.J. i./32,1054 on *p.* 66 are out of order ; they should precede the words varicose veins in italics. (Other sclerosing agents are referred to subsequently.)

Halogenised Aspirin Derivatives.—Both the Bromine and Iodine substitution compounds continue to attract attention. It is of marked interest that the strongly held halogen in the respective molecules (over 30% in the case of Sedasprin and over 40% in the case of Aspriodine), requiring in laboratory practice, fusion with alkali to effect removal, is proved to be liberated and absorbed in the human digestive tract.

Methyl-Aspriodine, which may be viewed as a derivative of Methyl Salicylate, having the Salicylic radical converted into Aspirin, with the inclusion of nearly 40% Iodine, has been subjected recently to animal experiments, in the hope that the compound would be tolerated by injection. In oily solution it is shown that the substance is tolerated even to the extent of 1 Cc. doses of 10% solution subcutaneously in mice. The method applied to the human being may be a useful adjuvant to local treatment by inunction in rheumatic affections—*v. p.* 81.

Acidum Sulphurosum.—New to this Chapter is the inclusion of **Magnesium Hyposulphite** employed both *per os* and intramuscularly as a remedy in resistant cases of asthma—*v. p.* 86.

Acidum Tannicum.—Concise directions are given for the Tannic Acid treatment of burns. As is common with all new procedures, some contra opinions have appeared. We include, however, a definitely favourable account from a hospital in an iron-smelting district, where the procedure is adopted as a routine with satisfaction —*v. pp.* 88, 89.

Æther.—This Chapter has been revised in numerous particulars. Attention is called to the data on *p.* 101 on Rectal Oil-Ether Anæsthesia. The opinion is given in the U.S.A., that it has ' wider limits of safety than any inhalation method.'

Alcohol.—It may be recalled that in our last edition we welcomed ' Regulation 10,' which was a part of the *Methylated Spirit Regulations,* 1925, as providing increased facilities for the supply on a written order or prescription of Industrial Methylated Spirits. Still further concessions by the Excise Authorities have been granted, and the Regulations governing the use of Methylated Spirits and Industrial Methylated Spirits have been consolidated in the form of the Methylated Spirits Regulations, 1930. These Regulations are clearly arranged, showing application to ' all users '—medical men, wholesale chemists, dispensing chemists, etc., on *pp.* 115 to 117. Properly appreciated, they render ' Surgical Spirit ' (*p.* 117), unnecessary, as plain Industrial Methylated Spirit without any approved denaturants (Castor Oil, Boric Acid—somewhat curiously conceived) takes its place. The last-mentioned had some vogue as a temporary

expedient in overcoming difficulties caused by the addition in 1924 of Pyridine to the formula for Mineralised Methylated Spirits.

Aldehyda.—**Paraldehyde**, given *per rectum*, as one of several Basal Hypnotics (to which further reference is made *postea*), is described as valuable and easy to work with—*v. p.* 122.

Amyl Nitrite.—A recent statement is to the effect that this standard remedy (and Nitroglycerin) may be used indefinitely in heart affections.

Antimony.—Several new Organic Antimonials are described, notably for treatment of schistosomiasis and for kala-azar. By far the most important work, however, of recent times in this sphere is the research that has been conducted at the Chemical Research Laboratory, Teddington. The composition of the Antimony analogue of Tryparsamide, made by others, could not be substantiated. We give a résumé of a number of new Aromatic Stibinic Acids made at the Chemical Research Laboratory, with their M.L.D.'s, determined by the Chemotherapy Committee of the Medical Research Council. They possess, however, only slight activity against *T. equiperdum*. Antimony Carbazole compounds are also referred to in the work from the Teddington Laboratory—*v. p.* 164.

Arsenic.—The Organic Arsenicals needed marked revision, especially the Aromatic and the Diphenyl Nucleus Series, which we differentiate with some semblance of logical chemical sequence, following the Aliphatics.

An amazing amount of 'literature' surrounds these compounds in general (sometimes perhaps of a purely propagandist type), and in each succeeding issue of the book it is found necessary to omit old information, and to digest and present the new with what we consider to be an accurate view of dosage and therapeutic utility, and—the most important factor from the human aspect—to provide cautions in regard to possible toxic effects arising from their administration. The probability of toxic effects resulting from these relatively slowly absorbed bodies given in massive doses is one to be seriously reckoned with.

Additions on this occasion are Parosan, Halarsol and Carbarsone.

The duplication in nomenclature of Organic Arsenicals imported from abroad presents added difficulties, and in this connection our method of conveying synonyms is, we think, convenient.

Concluding the Aromatic Series, certain new Succinyl derivatives of Quinquevalent Arsenic, which have been made at the Chemical Research Laboratory, Teddington, call for attention. They embody low toxicity accompanied by therapeutic activity. There are, further, from the same Laboratory, Malonyl and Glutaranilic Derivatives—*v. pp.* 190, 191.

With regard to the Diphenyl bodies, we were informed quite recently that Arsenobenzol has been 'discontinued' in favour of Novarsenobenzol. The preparation of the injection of the original compound gives, it is true, more trouble, but it is difficult to correlate its discontinuance with the recent statement (B.M.J. ii./31,157) that

'the first place must be given to 606—it hits the spirochæte harder and longer than 914—but reactions deterred many patients from continuing' (see our *p.* 196).

Combined Arsenobenzol and Mercury (or Bismuth) Treatment. On *pp.* 194, 195, we provide the result of an elaborate investigation under the Medical Research Council. On the question of differentiating between the inclusion of Mercury or Bismuth in the course, the opinion is that there is no superiority in Bismuth, though it is better tolerated than Mercury.

'Alternating' Treatment is thought economical and successful, whilst 'Concurrent' Treatment is wasteful and not productive of success, and yet, as an authority remarks, 'after 20 years' trial of Salvarsan there is an absence of unanimity as to the best method of treating syphilis'—*v.* *p.* 202.

Novarsenobenzol appears to be most used.

Our remarks relative to duplication in names apply strongly to the bodies allied to Novarsenobenzol.

Bismuth Arsphenamine Sulphonate (**Bismarsen**) is the outcome of research in the U.S.A.

It is relevant here to refer to **Bismuth Arsanilate,** which is more conveniently dealt with in the Bismuth Chapter (*p.* 238). This compound is an important one in the treatment of yaws and it has, to our mind, the advantage of relative simplicity.

Aurum.—On the subject of simplicity, just hinted at, is it not still a question why the elaborate and complex Gold Cyanides and Double Thiosulphates, etc., etc., should supersede a plain, definite, simple compound like 'Commercial Chloride of Gold,' an old though useful name, conveying Gold and Sodium Chloride ? This compound, at our suggestion, has been tried in leprosy and the associated eye affections.

Actually there is independent support for our suggestion (in the treatment of lupus erythematosus) that the simple body may be preferable to complex compounds—*v.* *p.* 212.

We provide data on the complex competitors of which there is now an extensive series—*v.* *pp.* 213 to 215.

Barium Sulphate.—The provision of a bulky Barium Sulphate meal for X-Ray purposes developed into quite a small thesis of its own. Our experiments are detailed on *p.* 216, the object being to produce a really minute precipitate.

Bismuth.—A somewhat similar investigation concerned the preparation of metallic Bismuth in the finest possible suspension for injection in syphilis and yaws.

We provide a working formula to effect the requisite reduction, starting from Bismuth Oxychloride. The particles were measured microscopically and the method has now been in operation some time in the author's laboratory for the provision of 'Injectio Bismuthi' in a dilute Glucose vehicle—*v.* *p.* 221.

Pulvis Bismuthi Compositus for the intensive alkaline treatment of gastric and duodenal ulcers is described at length on *p.* 224.

Bromum.—Tribromethyl-alcohol. *Syn.* Avertin, as a basal hypnotic, is the subject of over a page of discussion. We bring out many of the salient features in bold type for convenience—*v. pp.* 241, 242.

Chlorbutol (Chloretone).—The solubility of this compound has been attacked. A reasonable solubility is 1 in 200, as given in our pages for some years, and recently confirmed—*v. p.* 243.

Calcium Chloride.—May we draw brief attention in passing to the revision of the abstracts on *pp.* 252, 253. They are for the most part not new, but they have been re-arranged in alphabetical order for ready reference.

Calcium Gluconate.—This is stated to be the only Calcium salt available at present which can be injected into the muscles, in adequate doses. It is advocated in a variety of conditions attributable to Calcium deficiency. As is common with a large number of these procedures Pharmacology steps in and gives some warnings. The margin between effective and toxic dose is said to be not great —*v. p.* 257.

Calcium Lævulinate has been introduced as an alternative.

Carbon Tetrachloride.—The general conclusion as to a safe dose of this chemical for use as an anthelmintic, especially in ankylostomiasis, receives support from authoritative opinion in India.

Cerevisiæ Fermentum.—Sodium Nucleinate injections in septicæmia are dealt with on *pp.* 278, 279.

Coal Tar Derivatives.—Noteworthy in this Chapter are the comments on Acriflavine for prophylaxis in midwifery in respect of puerperal sepsis (the subject is further dealt with under Glycerin *pp.* 301, 432 and 433).

An improved formula for **Acriflavine Emulsion** has been published. By some, Acriflavine is regarded as near the Ideal Antiseptic. New uses of it, both local and by intravenous injection, are recorded.

Tetrophan is a further recently introduced Acridine compound —*v. p.* 304.

Phenylhydrazin and its Acetyl compound, given for their powers of destroying erythrocytes in polycythemia, are now included here with numerous references, *pp.* 307, 308, several of the statements emphasising caution.

Pyridium is a new vesical antiseptic. We cite its contraindications, which appear to be extensive—*v. p.* 308

Cinchophen is now described as 'often invaluable in chronic gout,' but it is requisite to test the patient with small doses at first. Attention is again drawn to toxic jaundice following its administration—*v. p.* 317. Perhaps patients are not sufficiently careful in following their medical advisers' directions concerning this and other medicaments. They do not realise the potency of these chemicals and in consequence may take them in excess.

Neotropin is a new urinary antiseptic—*v. p.* 319.

Percain.—This is a new local anæsthetic, effective in high dilution, and hence of interest for that reason—*v. p.* 319. It has a slow rate

of elimination and prolonged action. Details are given of various surgical procedures employing the anæsthetic.

Quinanil, a new Quinoline derivative, is used as a prophylactic antiseptic dressing for wounds and has various other local uses, *e.g.* as an irrigant—*v. p.* 320.

Amidopyrin.—It is held that this useful antipyretic has specific powers in measles. The pros and cons are provided on *pp.* 329, 330.

Cocæ Folia.—An interesting historical note on the first use of Cocaine by a practitioner in London—house physician at the time to Sidney Ringer at University College Hospital—is on *p.* 333. The first dose was 1/6 grain, which was gradually increased to ½ grain, given to him by a fellow resident, simply as a pharmacological experiment to test cutaneous sensibility to tactile, thermal, and painful sensations, and their distribution around the site of injection.

The next logical step, the injection of Cocaine Hydrochloride subcutaneously for surgical purposes, was the first occasion, so far as is known, of its actual use in a minor surgical operation, and the induction of a sufficiency of anæsthesia—*v. p.* 333.

Latterly, during the last decade or two, for reasons which we consider quite inadequate, Cocaine has been under a ban. To maintain that there is any marked misuse of the alkaloid in this country is of course absurd. The 'Yellow Press' must, however, continue to provide 'Yellow' stunts for consumers. A few weeks ago the smuggling of Cocaine in the ends of long cigars packed in petrol tins and thrown overboard in quiet harbours on the East Coast of England, from Dutch exporting localities, was dwelt upon to the extent of several columns by a newspaper famous for its enterprise.

Apart from journalistic 'stunts', we agree with the writer in the B.M.J. i./31,495, that 'misuse of Cocaine in England is *nil*.' On the subject of drug addiction in general, England is a model among nations in this, and kindred, spheres. Our Home Office knows of only 250 addicts. See our *p.* 561.

Novocain.—On *p.* 346 *et seq.* we provide a digest of new information on the induction of spinal and other types of anæsthesia with the aid of Novocain. The inclusion of Ephedrine in the technique is new.

The proprietary Spinocain, hailing from U.S.A., is briefly touched upon. A certain amount of doubt centres round the chemistry of Gliadin or Amyloprolamin, which is a constituent.

The controllable spinal anæsthetic introduced by the late A. E. Barker, comprising Stovaine with the addition of Glucose, has, so far as we recall, never been adversely criticised, and only quite recently an authority speaks of its having been used many hundreds of times—*v. p.* 352.

Anæsthesin has the advantage of being an innocuous anæsthetic soluble in oils. This property has been made use of in a solution termed 'A.B.A.', for injection in pruritus ani and anal fissure —*v. p.* 350.

Codeine.—Notes on Eucodal and Dicodid, two new narcotics, are included. These are both ℙ1 and ℍ, and their use is subject

to licence from the Home Office. They are not made in this country. Acetyl-dihydrocodeinone (Acedicone) came under the same régime within the last few weeks and similar remarks apply. It is added to Part III of the [H]. All these are referred to on *p.* 357, and are also in the Acts, *p.* 996 *et seq.*

Colloidal Metal Chapter.—Lead Selenide has half a page devoted to it, but the conclusion of a M.R.C. Report is that it is not curative of cancer—*v. p.* 368.

Digitalis.—Digitalis Leaf Tablets prepared with powdered leaf of the same strength as International Standard present a simple method of overcoming what may be termed ' Digitalis Difficulties.'

The writer has been interested in Digitalis for a good many years. So far as assay is concerned, he has from time to time had numerous comparisons made between, on the one hand, his colorimetric method (devised in 1912), and described in Vol. II, nineteenth edition, *p.* 72 *et seq.*, and results from Bio-Assay (M.L.D. for frogs) and he has no hesitation in remarking that the results *are comparable* ; this relatively simple test if carefully carried out will show whether a Tincture is below Standard or above Standard.

We have had occasion to compare (*a*) 1932, (*b*) 1931, (*c*) 1930 home-grown leaf, (*d*) leaf of British Standard (for which acknowledgment is due to the Department of Biological Standards of the National Institute for Medical Research), and (*e*) leaf supplied by a pharmacist friend in Spain, also an enthusiast on the subject.

This Spanish leaf had been collected 1200 metres up in the mountains at Salamanca (Sierra de Francia), and stabilised immediately after collection. Prior to sending tinctures of these leaves to our Pharmacologist, we found (*a*), (*b*) and (*c*) above standard, and the Spanish leaf (*e*) decidedly above by the colour assay method. (The marked potency of this Spanish preparation we attributed to sunlight rather than stabilisation.) *The potency of our own* (1931) *growing of leaf was confirmed by the Bio-Assay result.*

Ephedrina.—In our previous edition Ephedrine had merely some brief notes in the Supplementary List. These have been re-written and extended, and, together with numerous preparations suitable for prescribing, now occupy over four pages (397-401). The chief utility of Ephedrine is for asthma and hay fever, hence Nebulæ, plain and compound, and both oily and aqueous, are required. There has been some misconception as to the solubility of Ephedrine Base in Liquid Paraffin. Experiments were needed to determine the amount of vegetable oil to be incorporated to make a stable Spray Solution.

In similar manner, experiments were needed to produce a satisfactory Elixir for internal use in asthma, and whooping cough in children.

We regard the alkaloid as a [P1] Poison, and its sale is therefore protected. One case of overdose is recorded. We provide recommendations as to antidotes, on *p.* 397.

We would draw attention to the pages relative to treatment, as they are, for the most part, entirely new.

Ergot.—Defatted Ergot preparations in capsule form are useful for giving by the mouth. A large amount of investigation has been carried out to improve the *B.P.* '14 Ext. Ergot. Liq., which has been condemned as of no therapeutic value. Extraction with Dilute acidified Alcohol gives a preparation containing what are thought to be the specific alkaloid or alkaloids. P. Belg. IV. uses Tartaric, P. Ital. V. uses Acetic, and F.E. VIII. Hydrochloric Acid in their respective methods.

When the work of the Pharmacopœia Sub-Committee had been brought to a conclusion there appeared, curiously enough at the last moment—just prior to the new *B.P.* being available for inspection—a communication from the Registrar of the Obstetric Unit, University College Hospital, London, detailing a Clinical Investigation on the Action of Ergot Preparations on the puerperal uterus (B.M.J. i./32,1119). We refer to this on *p.* 402: the essence of the article is that the clinician *speaks highly* of the *B.P.* '14 Liquid Extract. The suggestion is made that perhaps the Liquid Extract contains an active constituent hitherto unidentified. The position has led to discussion from the clinical aspect, on the one hand, and the pharmacological on the other, which hardly calls for analysis in these prefatory notes.

We come now to the question of the colorimetric assay of Ergot preparations. The Pharmacopœia Commission issued in one of their Reports the suggestion that the colour intensity produced by mixing Paradimethyl-amidobenzaldehyde when added to a Tartaric Acid Extractive should be utilised as a method of assay. The intensity of colour is to be gauged in a colorimeter when it reaches a maximum. In sunlight only some ten to fifteen minutes are needed, but in diffuse light some two hours may be required.

The credit of employing this chemical as a reagent is due to a Dutchman who has made some elaborate trials with it in respect of a number of substances with which it responds by providing divers tints. A worker in the U.S.A. extended the matter in regard to the Ergot alkaloids. The potentialities of the test are, we think, adequately stated, on *p.* 403.

We felt that even these International efforts might perhaps be improved upon. There are other reagents giving colours with the Ergot alkaloids, and the suggestion is made on *p.* 404 that Ammonium Sulpho-Molybdate might be effective. Investigation showed that this reagent gives an *immediate* slate-blue colour of considerable intensity with Ergotoxine (and with Ergotamine), and it should be possible to compare the tint with that produced by Ergotoxine Ethanosulphonate. The exact conditions remain to be worked out. We may be able to attack the problem, which is surrounded with difficulties, again at a later date. Pressure of other matters prevented a completion of the experiments.

We hold that the *immediate* colour produced is of value—there is no need to work in sunlight, or to make adjustments for its absence, and certainly we feel strongly that the pharmacist should not be compelled to acquire an expensive colorimeter for this assay for a

drug actually in very slight general demand, if a simpler method of evaluating Ergot can be devised.

It is of interest to remark that apparently on the Continent generally, Ergotamine is more 'in evidence' than Ergotoxine. Ergotamine Tartrate is Official in P. Belg. IV. Reference should be made to *p.* 406 for some recent discussion on the two constituents.

Ferrum.—An outstanding feature of Iron Therapy for anæmia is that Ferrous Salts (*e.g.* Ferrous Chloride) are shown to be more effective than Ferric. There are notes giving this information on *pp.* 412, 413 and 420.

A small proportion of Copper as an adjuvant to Iron is also referred to on the same pages.

Gelatin Injections.—Under the designation gelatino-thorax, intrapleural injections of Gelatin containing Euflavine have been advised in the treatment of empyema thoracis—*v. p.* 425.

Glucose.—The Chapter is arranged under the headings Glucose Feeding (*per os*), Glucose Injections and Rectal Feeding, and a large amount of fresh information is incorporated in *pp.* 427–430.

Glycerin.—The theory has been advanced that in some cases of cancer there is incomplete combustion of fats and carbohydrates, causing superabundance of fatty acids, with possible formation of saponins, which, owing to their solvent effect on the Lecithin and Cholesterin of the cell, are extremely irritating, the alteration of surface tension produced having a profound influence on cell division. Glycerin intravenously (using a catalyst) may combine with fatty acids to form innocuous fat—*v. p.* 431.

The headings on *p.* 432—Germicidal Action of Glycerin, Glycerin as Surgical Dressing, and Hygroscopic Action—lead to the discussion of Glycerin in labour. A viscous hygroscopic fluid of this kind containing an antiseptic, if used during labour, should diminish the chance of infection from without, or from the vagina. Recommendations by numerous authorities are given on *pp.* 432, 433.

Hamamelis.—Cosmetics can hardly be ignored to-day. Some are good, but more (or is it less ?) common sense should be brought to bear on these preparations. Some trenchant criticism is on *p.* 448.

Hexamine.—Long experience in general practice has prompted communications on the utility of Hexamine in divers affections—in epilepsy, in phlebitis, and in rheumatoid arthritis, see *p.* 452. Our correspondent is a great believer in giving regular doses in a variety of ills.

Hexamine Salicylate receives commendation from a medical man who has suffered from chronic cystitis—*v. p.* 453.

Hydrargyrum.—The younger generation may be impressed with the intimation that there was no chapter on Mercury in the Extra Pharmacopœia until the 3rd Edition. It now occupies nearly 32 pages (454–486).

On *p.* 462 we deal with various *Links with Lister.* Lister was born in 1827 at Upton House, East Ham. We claim him, therefore, as a London man. We have recollections of the work done in our laboratories to assist Lord Lister, and we print on the page men-

tioned, relative to the pulling down of the Lister Ward at the Glasgow Royal Infirmary, the strong comments of Dr. A. Freeland Fergus on this subject.

Mercurochrome.—Some misunderstanding has existed as to the status of this chemical, both in regard to Patents and Trade Marks. The few lines on *p.* 477 make the position clear.

The compound should be deemed at least a Ⓟ Poison—legally, it is not a Poison at all.

As a rule one deprecates questions of priority—but we would record the fact of our priority as makers of this Organic Mercurial, so far as Great Britain is concerned.

It follows that some intimate knowledge of the chemistry, pharmacology, and methods of assay of the compound, has been gained in our works through an experience of nearly ten years.

Although containing more than 21% metallic Mercury, it is relatively non-toxic *per os.* Note the massive doses referred to on *p.* 478.

Intravenously, 10 Cc. of a 0·5% solution is the maximum dose. We have no great experience of the addition of Glucose, which has been suggested by others. Some hold that this addition may create a cumulative effect and for that reason is to be deprecated.

In the U.S.A. the Mercurial is, we understand, freely sold as a First-Aid dressing for wounds, abrasions, etc. A conservative view of the matter is perhaps desirable for the present.

A recent criticism of its antiseptic powers is provided in the Jl. A.M.A., July 9, 1932, where it is maintained that the dye does not penetrate living tissue and hence could not destroy bacteria in same.

Biological assay of Mercurochrome is dealt with at some length on *pp.* 478, 479. Animal experiments with it do not give entirely concordant data, and no exact figure per kilo weight of mouse can be taken as a hard and fast standard. One reads, indeed, that toxicities of samples for mice may vary in different laboratories of the same town.

The references to the literature on Mercurochrome occupy nearly four pages.

Meroxyl, Metaphen, and Neptal are new to the book.

Hyoscine.—Twilight Sleep induced by Hyoscine in 50% Magnesium Sulphate Solution, and other formulæ, is regarded as a routine by some—*v. p.* 492–494.

Iodine.—There are numerous recent remarks on the use of Iodine as an antiseptic. The midwife needs an antiseptic to kill streptococci on the hands quickly—within two or three minutes at most—and without previous washing. Iodine does this.

Coal Mines Regulations (First Aid) 1930 require it to be carried in the First-Aid outfit underground.

It is preferable that the Iodine should be dissolved in a solvent other than Spirit. Hydriodic Acid and other decomposition products which cause dermatitis when employed surgically may be formed in storage. Various alternative solutions have been adopted from time to time—Benzene, Carbon Tetrachloride, Isopropyl Alcohol,

and so on. The writer prepared a solution in oily combination to which the name Viodar is given. The solution, which is violet in colour, is stable in stoppered bottles. The preparation is neutral in reaction; its composition is such that it cannot turn acid. Applied to the skin the Iodine is rapidly liberated. The solution is adapted to both internal and local use. It represents Iodine in the free condition—*v. p.* 512.

A number of papers have been written on the French preparation Lipiodol, which is employed both therapeutically and in a variety of diagnostic procedures (in conjunction with 'X' Rays) relative to the lung and other parts of the body. The selection of an oil with which to combine the Iodine for combinations of this description has been investigated by pharmacologists—*v. p.* 515.

We revert to the controversy relative to Iodine in drinking water, and point out (*p.* 709) that Chlorination, so largely and successfully employed, does not deprive the consumer of the Iodine he needs, which is normally contained in drinking water.

Ipecacuanha.—The data on Emetine have been revised in many ways. There is no great influx of commendations concerning Emetine Bismuth Iodide—a compound introduced under erroneous premises, as the Emetine contained is liberated by physiological acid. We were asked the other day by a medical man from the tropics if we had ever taken it. He described the effects as drastic, even with the conjoint use of opiates.

The writer's preparation, Auremetine, in the form of a combined treatment, initiated by a specialist for whom he devised the chemical, is said to have stood the hardest tests and stands first in usefulness among the remedies at hand in a dysentery-infected locality in the East—*v. p.* 529.

Ligatures.—It will be noted from a M.R.C. Report that the sterilisation of catgut ligatures is well effected by Iodine. We give comparative data with other bactericides. Peppermint Oil is new for the purpose. Raw catgut may be treated by immersing first in a Bichromate solution, then in a solution of the oil—*v. p.* 533.

Magnesium Phosphate, Tribasic (as also the corresponding Calcium salt) is given as an antacid without producing systemic alkalisation.

Morphine.—℞ **Esters** of Morphine, their salts and preparations, etc., are embodied in an Order in Council. Further, preparations containing *any* proportion of Heroin are brought in, excepting five approved formulæ exempted by arrangement with the Pharmaceutical Society—*v. p.* 560.

The traffic in Dangerous Drugs in the Near East is described on *p.* 561, as also is Dilaudid, a narcotic analogous with Dicodid, to which reference has been made. Clinical experience of it is available —*v. p.* 562

Nutrimenta.—The Chapter contains a number of additions. Much continues to be written on Pasteurisation. Some relevant points are brought out on *p.* 581. It is nearly always considered rank heresy to criticise Pasteurisation, but it would seem that thermophilic and thermoduric bacteria may cause trouble. The consumption

of milk in this country is described as 'lamentably small.' It is not clear who laments, but from the consumer's aspect it may be asked whether this small consumption is not brought about by an innate instinct in the direction of self-protection.

Accessory Food Factors.—The Permanent Standards Committee of the Health Organisation of the League of Nations makes recommendations regarding standards for Vitamins 'A' to 'D'—the standards to be kept at the National Institute for Medical Research.

Crystalline products of high activity have been obtained. Calciferol is stated to be pure crystalline 'D'—*v. p.* 587 *et seq.*

The pages devoted to Vitamin preparations of commerce (*pp.* 593, 594) will we hope be of service to the practitioner, and incidentally, we trust, to the manufacturers. They are, with one or two exceptions, all British products.

Oleum Chaulmoogræ and Oleum Hydnocarpæ.—A great deal may be said for the curative powers in leprosy of Chaulmoogra Oil, given preferably in the form of Sodium salts of the constituent fatty acids. We have from time to time supplied preparations of this type for treatment to clinics and leprosy centres in various parts of the world, frequently with gratifying results—note, for example, those referred to on *pp.* 604, 605.

Ramifications and modifications are regarded with some degree of incredulity. To our mind, the position needs a 'clearing house' to sort the good from the bad. Why should **Ethyl** Chaulmoograte or **Ethyl** Hydnocarpate have greater efficacy than the original oil? If modifications are better why do they not oust the parent compounds *in toto?* Whatever preparation is used in treating leprosy we think its use need not be painful.

The name for *B. leprœ* has been changed to *Mycobacterium leprœ.*

Oleum Morrhuæ.—Scottish oils rank first, then Newfoundland, then Norwegian in Vitamin richness. This is as it should be!

Sodium Morrhuate.—Chemical criteria are provided, from our experiments in 1931, for a pure Morrhuate. The acids should be pale yellow and of stated Iodine value. There should be no resinous matter insoluble in Ether.

It will be remembered that the *un*saturated acids of this and other fats were originally employed in treatment of various kinds and it seems reasonable that Palmitic and Stearic Acids should be removed. The author employs a process of fractional precipitation as in the case of the Chaulmoograte. This produces a solution of Sodium Morrhuate as a sclerosing agent which is pharmaceutically more elegant, as it will not deposit in cold weather. The evidence on the whole is that Sodium Morrhuate is a good preparation for the treatment of varicose veins—*v. pp.* 613-615.

Insulin.—The system of dosage, details of diet, technique of injection, treatment of coma, and so on, have been revised. Some Insulins are made from ox, others from pig's pancreas. The preservation of Insulin, *i.e.* whether with or without Cresol, receives consideration —*v. p.* 640.

The extent of *general use* of Insulin does not appear to be adequate, according to a M.R.C. Report—*v. p.* 638.

Glowing testimonies of the extension of life that its injection causes are to be found. A medical man writes ' previously forced to give up work and live on starvation diet. Now able to do 14 hours' work a day.'

Castor Oil as suspending agent is dealt with on *p.* 642.

Since the war diabetes has apparently become more common.

Peptone Therapy.—Desensitisation by immunisation with non-specific protein continues to be an effective procedure, especially by means of graded doses of Peptone. This agent would seem more rational than the injection of a remote type of protein, *e.g.*, of bacterial origin. Recent results are available on *p.* 670.

Phenolphthalein. Sodium Fluorescein.—As the outcome of some interesting and valuable work in London a treatment of malignant disease has been evolved employing Sodium Fluorescein, followed by X-irradiation. No pain is caused. Results are given on *p.* 673. Other dyes have been used in similar manner—*v. p.* 674.

Sodium Tetraiodophenolphthalein, etc.—The single-dose method of employing this chemical in cholecystography has advantages for oral administration. Limitations of the diagnostic capabilities of the test are brought out in a communication by an authority—*v. p.* 678.

Intravenous use should be avoided. Two or three pages on the intravenous method have been omitted.

Plumbum.—A matter of interest here is industrial and other types of poisoning by minute doses of Lead.

An improved method of making Goulard's Extract is given, with notes on assay from friends in Australia.

Quinidine, Cinchonidine, Cinchonine and Cinchona Febrifuge.—The apparently diametrically opposed interests regarding the production of an adequate Cinchona Febrifuge for employing in malarious districts seem to need what is sometimes called the Mussolini touch.' It is indeed a ' variable product.' The latest requirement (from the Malaria Commission) is that **Totaquina** should contain 70% crystalline alkaloids of which not less than 15% should be Quinine.

A friend, travelling in S. America, who has been much exposed to the possibility of malarial infection says ' Cinchona Febrifuge is useful but might be better borne and more effective if Quinine, and the useless and toxic alkaloids, were *left out*. The Quinine could be added if desired '—*v. p.* 713.

Our friend makes a useful suggestion as to Quinine Base and Sodium Bicarbonate Tablets for prompt effect—*v. p.* 718.

Quinine-Mannitol is a form of basic Quinine designed by the writer to replace acid solutions employed in the past, as being more likely to be absorbed by the blood, and less likely to produce bad effects at the site of injection. Although possessing obviously a scientific *raison d'etre,* clinical data upon the preparation are as yet not extensive.

Quinisan is a new Quinine salt—*v. p.* 729.

Quinine and Urethane Injection for varicose veins is discussed at length on *pp.* 734–736. The method was originally popularised in France. It is well spoken of by a surgeon at one of our leading hospitals.

Quinine Prophylaxis in malaria. No general rule can be laid down. So far as an individual returning from the tropics is concerned, the evidence is that he, or she, should continue to take Quinine.

With regard to prevention of malaria, there is new information on *pp.* 744–745 relative to the German synthetic, Plasmoquin. Atebrin (*Syn.* Erion) is also referred to. Its action is the reverse of Plasmoquin and it appears to be of little use in prophylaxis.

Sodium Iodo-Methane Sulphonate.—This compound contains 52% Iodine ; it is given intravenously in pyelography, enabling a skiagram to be taken within a few minutes, the opacity persisting for a considerable time—*v. p.* 769.

Stramonium.—Preparations of the leaf, especially in the form of Extract given in bold dose over lengthy periods have useful palliative effect in chronic encephalitic parkinsonism. *Per os* medication has marked advantages over irksome routine hypodermic injections —*v. p.* 780.

Sulphur.—To induce a febrile condition of short duration as a succedaneum to infecting with malaria in the treatment of general paralysis and other types of nerve disease, graded doses of a solution of Sulphur in Oil for injection intramuscularly have been tried. The opinions expressed on the procedure diverge to some extent—*v. p.* 789.

Sulphur found better than malaria where the patient is too ill to stand the latter treatment.—L.ii./32,387.

Urea.—With the continued flooding of the field of therapy with chemicals of the poisonous Ureide type we have had again to consider very carefully whether not only *single* chemicals but combinations containing a high proportion of these Ureides fall into [℗1]. or the 'admixture' clause in Ⓟ of the Poisons Schedule. We can find no reason whatever for rendering the sales of such medicines more easy, and we should welcome a simple modification of the Schedule worded in such a way as to bring into [℗1] 'preparations of Barbituric Acid derivatives in *any* proportion.'

Chemists abroad have been occupied in introducing radicals of many types into the molecule of plain Barbituric Acid in exchange for the two Ethyls with which one had become familiar in the case of Veronal. The possibilities may not have been entirely exhausted, but the complexity of the resulting substances is, to say the least of it, a little absorbing.

We have endeavoured to present them in chemical sequence, passing from Veronal (*pp.* 806–808), and omitting older friends, to Nembutal (*p.* 811), thence to Amytal (*p.* 812), Phanodorm (*p.* 814), and Pernocton (*p.* 815), concluding (*pp.* 817, 818) with certain compounds which though allied, cannot be considered derivatives of Barbituric Acid.

Reverting to Nembutal, this is a basal hypnotic, given *per os*, *per rectum*, and by intravenous injection to bridge the gap between

consciousness and unconsciousness before inducing general anæsthesia.

The subject of Basal Hypnotics is new and certainly in this country there is no extensive knowledge to enable anyone to dogmatise about it. We commend *p.* 811 *et seq* to those contemplating their employment. The current information from the makers of Nembutal lays stress on *oral* administration in preference.

Perhaps a very pointed assessment of the entire subject is the finding by the Committee of Reference working in conjunction with the American Medical Association that Pernocton is not acceptable by them on the grounds, *inter alia*, that 'there is lack of critical evidence that routine intravenous injection of potent narcotics is desirable or safe'—*v. p.* 815.

On *p.* 1062 there is a note by an authority to the effect 'the most valuable basal hypnotics are Paraldehyde or Avertin *per rectum*, or these Barbituric Derivatives.'

The position at the moment, so far as our knowledge goes, is that Paraldehyde, Nembutal and Avertin are most in demand for the purpose.

In the **Supplementary List** one may point to the treatment of chronic ulcers from Chromium plating, Bulbocapnine in paralysis agitans and other types of tremor, Harmine and Harmaline, Kurchi Bismuth Iodide, Uroselectan (a Pyridine derivative), Soy Bean preparations, Xysmalobinum—a glucoside from the root of a S. African plant, and the relegation into this Supplement from the main body of the work of a number of medicaments not now in extensive demand.

VACCINES.—As to Bacteriophages it is said that 'many disagree with the French authority profoundly.'

On the subject of Vaccine Therapy in general there are recent opinions on *p.* 900.

Every Vaccine in the Chapter has been gone through 'on its merits' with regard to questions of dose, standards, etc., and these have been brought up to date as far as possible.

Tuberculins.—B.C.G. for the prophylactic vaccination of infants receives criticism, for the most part destructive, we fear, on *p.* 934.

Vaccine Lymph.—The Ministry of Health Committee's Report on Vaccination and the League of Nations' Commission Report on post-vaccinal encephalitis are given in brief on *pp.* 944, 945, with reports on fatal cases.

ANIMAL ORGANOTHERAPY.—The preparation of **Powdered Liver Extract** for administration in pernicious anæmia is referred to, with descriptions of several extracts of commerce, one of them for intravenous use. Its specific power in the affection is confirmed —*v. p.* 951.

It may be added that recently (B.M.J. ii./32,349) Extracts of **Fish livers** were found potent in pernicious anæmia. The daily dose was 50 Gm. (= 1000 Gm. of raw fresh liver). This preparation is far cheaper than mammalian

liver and its employment would be of help to the fishing industry around our coast.

Muscle Extract (Extract of Heart Muscle) has been advised for use in heart affections.

Numerous **Ovarian Hormone** preparations which claim to have effect in ovarian disorders, and to be of service at the climacteric, are dealt with on *pp.* 954–955.

Pituitary Gland Extracts.—The Chapter has been revised, attention being paid, for example, to the separation of the Oxytocic and the Pressor principles, as distinct substances—*v. pp.* 955–963.

Placental Hormones.—Emmenin has been used in dysmenorrhœa with encouraging results. It also corrects amenorrhœa of recent origin and has been found of use in other affections of women—*v. p.* 963.

Stomach, Desiccated.—The Liver treatment of pernicious anæmia was followed by giving the whole desiccated hog stomach. It was shown that the stomach normally secretes a substance which can extract a blood-maturing principle from meat. It was concluded therefore that 'stomach feeding' would have the same effect as liver. Reports are very promising. Several British-made stomach extracts are described on *pp.* 965, 966.

Suprarenal and its active constituent are now well known. The cortical hormone has been used in Addison's disease.

Thyroid.—The Pharmacopœia Commission proposes to determine the Iodine in dry Thyroid in terms of Thyroxin Iodine.

Intravenous Dose Table.—The remark from a practitioner added on *p.* 1102 to the Intravenous Dose Table which was compiled for the last edition, that 'every kind of intravenous injection except Normal Saline has at some time or other proved fatal' is a sweeping one, though it may well be taken to heart as a general warning for extreme care.

Two interesting additions to the table are Glycerin and Morphine.

In the pages devoted to Legal Requirements (989-1021) the following are noteworthy :—

DANGEROUS DRUGS ACTS.—Our 'Summary', *p.* 996, has had to be rewritten to include a number of recent additions, *e.g.* relative to Heroin, Morphine Esters, Eucodal, Dicodid, Dilaudid, Acedicone, etc. Some of these are only available by Licence.

Part III. of the 1920 Act (*p.* 997) embodies these additions. The 1925 Act (*p.* 999) dealt in particular with Heroin.

The **1928 Dangerous Drugs (Consolidation) Regulations** are of great importance to the Profession and to others having dealings in dangerous drugs. The Regulations are given in a somewhat abbreviated form and with the main issues in bold lettering on *pp.* 1000–1004.

The **1932 Dangerous Drugs Act.** This enactment to restrict the manufacture of dangerous drugs including Codeine and Dionine was 'initiated' on the basis of illicit trading in Morphine in the Far East (*p.* 1006). Its *raison d'être* is explained on *p.* 355

THERAPEUTIC SUBSTANCES REGULATIONS, 1931, supersede those of 1927, and hence our summary needed re-writing—*v. pp.* 1016–1018.

The **THERAPEUTIC INDEX,** *pp.* 1022-1094 has been subjected to the blue pencil and at the same time extended by many additions.

International Atomic Weights.—The necessary corrections in atomic and molecular weights have been made in accordance with alterations that have been agreed upon since our last edition. Calculations are in the 1932 International Atomic Weights.

The 1925 Weights, *e.g.* of Arsenic, Barium, Calcium (this year), Cerium, Hydrogen, Lead, Phosphorus, Potassium, Sulphur, *inter alia* were altered.

The time entailed in working through the compounds containing Hydrogen, to make the molecular quotient up-to-date by the needed change from 1·008 of 1925 to the current 1·0078 is begrudged.

Solubilities.—The Solubilities we print are intended to be *reasonable* solubilities such as would be needed at the dispensing counter under mean temperature conditions.

Naturally, the generally used 15° C. approx. for room temperature has formed the basis for our determinations.

The common-sense of the position is that a chemical is often far more soluble at summer temperature than in the winter, and annoyance, if not danger, may arise when a chemical deposits from solution.

PATENTS AND DESIGNS ACT, 1932. This Act, which comes into operation November 1, this year, has important bearings for the medical worker and the manufacturer of chemicals for use in medicine.

It amends the Patents and Designs Acts 1907 to 1928. A Patent may now be revoked on any of the following grounds :

That the invention was the subject of a valid prior grant, that the first inventor was not the applicant, that the Patent was obtained in fraud, that it is not a manner of new manufacture, that the invention is obvious, or not useful, that the complete specification does not sufficiently describe the nature of the invention and the manner of its performance, that the invention claimed in the complete specification is not the same as that contained in the provisional specification or the same as that for which protection has been applied for outside the U.K., that the patent was obtained on false representation, that the invention was secretly worked on a commercial scale prior to the date of the Patent.

If the Comptroller is satisfied that the monopoly rights have been abused in such a way as unfairly to prejudice in the U.K. the manufacture, use, or sale of materials involved in the process of the invention he may order the grant of licences to the applicant or his customers.

Clause 38A of the Principal Act (1907) is now amended to read, ' Provided that in relation to a substance intended for food or ***medicine a mere admixture*** resulting only in the aggregation of the ***known properties of the ingredients*** of that substance ***shall not be deemed to be a method or process of manufacture.***'

(*See also p.* 1021 *for the Act of* 1919.)

A Conference on Medical Patents called by the **B.M.A. in April 1932** passed resolutions to the effect that they considered the granting of further patents in the medical field undesirable, that the granting of patents for biological remedies (serums, toxins, vitamins, etc.) was detrimental to research, that the granting of patents for synthetic remedies is not so detrimental

and that a system should be established by which such patents could be ***dedicated to the use of the public*** in this country ***while affording priority of action in other countries,*** and that they considered it undesirable that medical men should apply for patents in the medical field until some such system is established.—B.M.J. Supp., May 28, 1932, *p.* 256.

These recommendations came too late for consideration in connection with the Patents and Designs Acts, 1932 (*antea*), but "there is reason to believe that the Government will be willing to hear evidence as to the effect of patents on research and practice."—Sir H. H. Dale, B.M.J. Supp., July 2, 1932, *p.* 10. *For further references see our p.* 1021.

TRADE MARKS.—As in past editions, we provide the numbers of British Registered Trade Marks in respect of remedies, etc., wherever applicable, with ✱ preceding such Trade Marks.

Our search for this purpose at the Patent Office covers Classes 1, 2, 3, 42 and 48, in the Public Register, as available up to the time of going to press. Further data on these Classes are on *p.* 1020.

It may be of interest to remark that the earliest Mark in the book is 464, applying to ✱Nepenthe, while the current number at the Patent Office is over 535,000.

Synonyms.—The application of Registered Trade Marks to 'Brand' manufacturers' Proprietaries opens up a big question. The author holds that a producer is justified in adopting the procedure. He sees no reason, for example, why a maker should not apply, if he wishes, the Trade Mark "Empirin" to Aspirin, or "Sedasprin" to Acetyl-Bromo-Salicylic Acid. These cases refer to relatively simple substances. It is, however, when we get further into chemical fields, *e.g.* amongst the complex Organic Arsenicals, that confusion is almost bound to occur owing to the absence of uniformity in *chemical* nomenclature, and the fact that the correct complete chemical composition is not always disclosed.

To bring the matter to an issue, some useful official work might be done to clear up what promises to be a menace. This work would be appreciated by the Medical Profession, but it should be clearly understood that the British producer is justified in applying a Brand T.M. designation to his goods, and any type of substitution or 'passing off' should be prevented. We need not go deeply into it but some curtailment will be needed in the future, and it would be to the good of all concerned.

Absence of Clearness in Prescribers' Wishes.—A small point arises which we would impress on the Profession regarding some prescriptions, *viz.*, that they are written in a way to make it impossible for the dispenser to determine whether the amounts prescribed refer to the total amount to be divided into a number of doses, or whether the amounts apply to the single dose, to be multiplied in consequence by the number of doses to be supplied. In the case of definite chemical substances confusion is not so likely to occur, but we have known instances in respect of relatively indefinite medicaments, *e.g.* organotherapeutic preparations—Thyroid—which are given both in massive doses or in intentionally small ones, where it was impossible to say what was wanted, owing to the vague wording of the prescription.

We would specially mention that the book has been almost entirely re-set by our printers on their own initiative, and the result, we submit, calls for commendation of their efforts. They realised that the face of some of the standing type had become worn. This work, apart from involving heavy expense, entailed the most assiduous attention on the part of their readers (duplicated, of course, by the writer and his staff). Slips, the result of high pressure effort, may have crept in; a few that have been found are in a short list of Corrigenda, at the end of the Index. Users of the book will please be on their guard against mistakes, if any, that have escaped notice; the pages now contain a considerable amount of detail.

As this is the fiftieth year of publication it may be of interest to mention that the EXTRA PHARMACOPŒIA was first published in 1883 as a collaboration between the late W. Martindale and the late W. Wynn Westcott. The book was continued under this conjoint authorship until the 10th Edition, in 1901.

On the death of W. Martindale in 1902, his son, the present author, carried on the work through eight editions with Dr. Westcott, until the death of the latter in 1925. Since then the writer has issued the book with the aid of occasional assistance from medical friends on points of difficulty.

Apart from the help of medical men, he desires on this occasion to record his acknowledgment and appreciation of the services of his assistants—A. J. V. Field, Pharmacist; F. G. Dewdney, Chemist; and his Secretary, S. L. Ward, whose skill and perseverance have been of value in many particulars.

The times of stress in the commerce of the world, and consequent International considerations to-day, create an inclination to dilate upon them in a few words.

We wrote at length on the post-war position in our 17th Edition (1920), pointing out, broadly, that Science *was not and had not been*, International. There is no reason to regret one word that was penned on that occasion. (Reverting to our opening remarks, States with divergent commercial views can at least agree on important medicinal issues.)

Since then the trade pendulum at home has swung first to the detriment, and then, we trust, to the advantage of the British manufacturer, but even this last mighty effort (for which foreigners cannot blame us) seems likely to be smirched by degrees of bitter internal competition, sometimes of an objectionable description.

We plead heart and soul for more sportsmanship in our avocation.

As a distinct and separate issue, the Medical Profession at home is again appealed to to support the British producer. It is a curious fact that with all his excellence the medical practitioner sometimes seems blind to the interests of the labour market. He has it in his power—witness the immense gathering of the Profession at the Centenary Exhibition of the British Medical Association in London a few weeks ago—to create employment within the Empire literally

for thousands of men and women, where to-day the figure is of the order of tens or at most hundreds.

We referred earlier in this preface to a M.R.C. statement of regrets that the general use of Insulin has been ungratifying; on an allied train of thought, one might remark that there are many formulæ (devised or suggested by medical men) for useful non-proprietary preparations in this book which could, we believe, enjoy greater popularity; their recommendation would certainly tend to create employment.

Writing on behalf of manufacturing interests, makers of medicinal chemicals ask for a helping hand for their employees whenever it is possible to give it and they would urge the Profession to foster trade within the Empire.

In closing these prefatory remarks, the writer hopes that some of the information embodied in this edition may prove helpful to suffering humanity in regaining and retaining—to borrow the phrase of an old friend—that priceless blessing, good health.

W. HARRISON MARTINDALE.

12, New Cavendish Street,
London, W.1.
September 29, 1932.

SYNOPSIS

of the PRINCIPAL ADDITIONS AND CHANGES (MARKED **C**) effected in the **British Pharmacopœia '32.**

This Synopsis mentions only the principal changes: for any preparation not in this list, reference should be made to the official work.

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Acetum Scillæ	**C.** *About half strength of B.P.'14,—v.p.* 882	
Acidum Citricum	**C.** *Acid made synthetically from Glucose is also recognised.*	
Acidum Hypophosphorosum Dilutum	*Same as on p.* 682.	
Acidum Lacticum	**C.** *Strength increased—contains* 87·5% *Lactic Acid—v.p.* 48–49.	5–20 *minims.*
Acidum Phosphoricum ...	**C.** *Increased to* 89%, *with Sp. Gr.* 1·75 (*was only* 66·3%), *thus approximating U.S.X.—v.p.* 55. *Care will be needed by Pharmacists in making preparations, e.g., Chemical Foods, by existing formulæ—v. p.* 418.	
Acidum Trichloraceticum ...	*Same as on p.* 24.	
Acriflavina	*Of recognised composition—v.p.* 297.	*No dose given.*
Adrenalina	**C.** *Synthetic recognised in addition to natural—v.p.* 968.	
Æthylenum	*For anæsthetic uses—v.p.* 288.	
Agar	*From Gelidium corneum and other species—v.p.* 833.	
Alcohol	95% *by vol.* (94·7 *to* 95·2% *by vol., or* 92 *to* 92·7% *by wt.*) *as P. Off.—v.p.* 108.	
Amidopyrin	*Same as on p.* 329.	
Ammonii Bicarbonas ...	*A component of Ammonii Carbonas. It is rarely used in medicine—v.p* 140.	5 *to* 10 *grains.*
Amylocainæ Hydrochloridum	*Same as on p.* 350. *Also known as Stovaine.*	
Antimonii et Sodii Tartras ...	*Same as on p.* 162.	
Antitoxinum Diphthericum...	*Cf. our p.* 910.	*Therap.* 10,000 *to* 20,000 *units.*
Antitoxinum Tetanicum ...	*Cf. our p.* 923.	*Therap.* 20,000 *to* 40,000 *units.*
Antitoxinum Welchicum ...	*Cf. our p.* 1075.	*Proph.* 4000, *Therap.* 10,000 *to* 20,000 *units intrav.*
Aquæ Concentratæ, Anethi, Cinnamomi, Menthæ Piperitæ	*Made with* 90% *Alcohol and water mixture: Alcohol content* 52–55% *v/v. We have advised* 70% *Alcohol.*	

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Aqua Sterilisata	*Distilled water autoclaved or boiled 30 minutes. Use within 1 month. For intrav. use distil distilled water and autoclave, etc. Use within 24 hours.*	
Barbitonum Solubile ...	*As on p.* 809.	
Barii Sulphas	*Cf. our expts. for producing a fine precipitate, p.* 216.	
Belladonna Pulverata ...	*Alk. Strength* 0·3%. *When Belladonna Leaf is prescribed, this is to be dispensed (Belladonnæ Folium is retained, containing not less than* 0·3% *alkaloids)—v.p.* 217.	
Belladonnæ Radix	C. *Now standardised, cf. p.* 217, *to not less than* 0·4% *alkaloids, calculated as Hyoscyamine.*	
Benzocaina	=*Anesthone or Anæsthesine, v.p.* 349.	5 *to* 10 *grains* (*we give* 3 *to* 8).
Bismuthum Præcipitatum ...	*We have experimented on the manufacture of this metal in fine powder and provide a formula—v.p.* 221. *Used for Injectio Bismuthi—v.p.* 222.	1½ *to* 3 *grains intram.*
Caffeina et Sodii Benzoas ...	*Customary p. æq. approx. of constituents—v.p.* 246.	
Calcii Chloridum	*Anhydrous, as in B.P.'*14, *cf. other National pharmacopœias—v.p.* 249	*Intrav. dose given* 5–15 *gr.—cf. p.* 249 *& v.p.* 252 *et seq.*
Camphora	*Synthetic is now also Off.—v.p.* 259–260.	
Carbonei Dioxidum ...	*v.p.* 22.	
Carbonei Tetrachloridum ...	—	30 *to* 60 *m. given: stringent criticism has been made, cf. our p.* 271.
Carbromalum	*This is the U.S.X. name for Bromdiethylacetyl Urea—v.p.* 810.	
Cataplasma Kaolini	*Contains less Kaolin and more Glycerin than U.S. VIII. Cf. p.* 435.	
Chloramina	*v.p.* 46.	
Chlorbutol	*v.p.* 243.	
Cinchophenum	*v.p.* 316.	
Colchici Cormus et Semen ...	C *Now standardised, but the requirements are less than U.S.—v.p.* 357.	
Collodium Flexile	C. *Colophony replaces Canada Turpentine. The P. Off. form, as on p.* 359, *is used. We found it too thin.*	
Dextrosum	*In crystal or granular powder—v.p.* 427–430.	

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Digitalis Pulverata (in addition to Digitalis Folium, dried between 55 and 60·C.)	*Assayed biologically and compared with International Standard powder. Each Gm. to contain* 10 *units. For making Inf. Digitalis Recens, Standard Digitalis Powder is used and for the Tincture, Digitalis Folium or Standard Powder—in the former case it is assayed biologically subsequently—v.p.* 385.	*Max. doses* 1½ *gr.* (1 *unit*) *or as single dose* 10 *gr.* (6 *units*).
Elixir Cascaræ Sagradæ ...	*Cascara mixed with Light MgO and Licorice is percolated with water, evaporated, and Saccharin, Oils, Glycerin, Alcohol, etc., added. Cf. several formulæ pp.* 274,275.	
Emetinæ Hydrochloridum	*A formula with* $7H_2O$ *is given—v.p.* 519.	
Emetinæ et Bismuthi Iodidum	*Emetine content* 25 *to* 28%*—v.p.* 523.	
Ephedrinæ Hydrochloridum.	*Obtained from E. sinica, E. equisetina and others, as stated on p.* 397.	¼ *to* 1½ *gr. Cf. our note regarding* 1 *gr. dose.*
Ergota Præparata	*Made by 'defatting' Ergot. Both are standardised colorimetrically—v.p.* 403.	
Ergotoxinæ Æthanosulphonas	*v.p.* 406.	1/120 *to* 1/60 *grain hypod.*
Erythritylis Tetranitras Dilutus	*Erythrol Tetranitrate mixed with Lactose. Erythrol Tetranitrate is a dangerous chemical, decomposing spontaneously on storage. The Tabellæ made by the writer for many years are safe and convenient—v.p.* 408.	½ *to* 2 *gr.* = ¼ *to* 1 *gr. Erythrol Tetranitrate. The dilute preparation must be given when 'Erythrol Nitrate' is prescribed.*
Eucalyptol	*v.p.* 610.	
Extractum Cinchonæ ...	*The Extract is variously standardised on the Continent. P. Ital. V. has* 10% *as this new Off. preparation—v.p.* 294.	2 *to* 8 *grains.*
Extractum Colchici (Seminum) Liquidum	*Standardised, cf. U.S. and other National Pharmacopœias, p.* 358.	
Extractum Colchici (Corm.) Siccum		
Extractum Colocynthidis Compositum	C. *Aloes used vice Extract—v.p.* 373.	
Extractum Ergotæ Liquidum	C. *After defatting, percolation with* 1% *Tartaric Acid in* 50% *Alcohol is used instead of maceration with water. It is standardised colorimetrically. Loses activity on keeping, but should not be less than* 0·04% *of total alkaloids calculated as Ergotoxine—v.p.* 402.	

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Extractum Hepatis Liquidum	*Ox or sheep liver, cf. pp.* 951,952.	1 *oz.*
Extractum Hepatis Siccum...	*Ox or sheep liver, cf. pp.* 951,952.	*Dose equiv. to* 225 *Gm. fresh liver.*
Extractum Hyoscyami Liquidum	*Standardised, approximating that of U.S.—v.p.*495	
Extractum Malti	*v.p* 541.	
Extractum Malti cum Oleo Morrhuæ	15% *Cod Liver Oil by vol.—v.p.* 542.	
Extractum Pituitarii Liquidum	10 *units per Cc.—v.p.* 958.	*Dose stated in units—*2 *to* 5 *units subcut.*
Extractum Senegæ Liquidum	*Made by percolating with Alcohol* 60%, *evaporating and adding Ammonia till alkaline. Strength* 1=1 *as U.S.X.—v.p.* 883.	
Extractum Sennæ Liquidum	*Made by maceration. Cf. p.* 884.	
Fluoresceinum Solubile ...	*Cf. data pp.* 672,673.	
Gelatinum Zinci	*Similar to Unnias Paste on p.* 823.	
Hydrargyri Oxycyanidum ...	*Composition agrees with that on our p.* 460.	
Ichthammol	*Cf. p.* 497.	
Indicarminum	*Cf. Discussion of the Chemistry of Indigo Carmine, V. II. p.* 62. *The material must be of exceptional purity chemically.*	*The subcut. or intram. dose is given as* $\frac{3}{4}$ *to* $1\frac{1}{2}$ *gr. and* $\frac{1}{8}$ *to* $\frac{1}{4}$ *gr. intravenously. We find* 10 *cc. of* 0·4% *soln. intrav. approved by surgeons, i.e.,* 2/3 *grain.*
Infusa Concentrata Aurantii, Buchu, Calumbæ, Caryophylli, Gentianæ (Co.), Quassiæ, Senegæ, Sennæ...	*Some made by maceration, others by percolation. Alcohol content* 21–25% *To be diluted* 1 *to* 7 (*i.e.,* 1 *with* 7). *Cf. Data, pp.* 499,500.	
Infusum Digitalis	C. *Made with Standardised Powder.*	
Infusum Sennæ Recens ...	C. *Senna pods vice leaves.*	
Injectio Bismuthi	*A* 20% *suspension in* 5% *Glucose, as made by the writer—v.p.* 222.	
Injectio Bismuthi Salicylatis	*A* 10% *preparation with Camphor and Phenol added, in Olive Oil, sterilised at* 150° *for an hour.*	10 *to* 20 *m. intram.*
Injectio Ferri	*Contains Iron and Ammonium Citrate equivalent to* 1/10 *grain of Iron in* 30 *minims.*	15 *to* 30 *m.*

		Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Injectio Hydrargyrii ...		*The formula adopted (10%) as P. Off. p. 455 is quite satisfactory. It is a slight modification of Lambkin's form.*	*5 to 10 m. intram.*
Injectio Hydrargyrii Subchloridi		*A 5% preparation. The same remarks apply. Cf. P. Off. form. on p. 475.*	*10 to 20 m. intram.*
Injectio Sodii Chloridi et Acaciæ		*6% Gum in Normal Saline. Cf. much information on the matter on pp. 1 and 2.*	*No dose is given.*
Insulinum		*The details on p. 636 revised from 'Diabetic Life' by R. D. Laurence, amplify the B.P.'32 directions as to dose.*	
Iodophthaleinum		*Cf. p. 674 et seq.*	*1/3 to ½ grain per lb. (per os) given, agrees with the 0·04 to 0·07 Gm. per kilo stated on our p. 675. We do not advise intravenous use.*
Ipecacuanha Pulverata ...		*This is in addition to Ipecacuanha (Root). Both are standardised to the F.I. strength—v.p. 517.*	
Jalapa Pulverata		*This is in addition to 'Jalap.' Standardised Resin content 10 and 9% respectively.*	
Lævulosum		*Cf. p. 750.*	
Linimentum Aconiti ...	C.	*Not now standardised.*	
Linimentum Belladonnæ ...	C.	*Standardised.*	
Liquor Adrenalini Hydrochloridi	C.	*Chlorbutol 0·5% as preservative, as in F.E. VIII. & P. Belg. IV., instead of Chloroform—v.p. 969.*	
Liquor Amonii Acetatis Fortis		*Standardised to definite content (57·5%) of Ammonium Acetate as P.Off.p. 145. It is intended to be diluted 1 to 7, making 7·2% to make Liquor Ammoniæ Acetatis Dilutus. Cf. the B.P.'85 preparation (Fort.) and U.S. (Dil.), p. 145.*	*15 to 60 m.*
Liquor Arsenicalis	C.	*Is now neutral and colourless, as P. Off., p. 175. Contains no Compound Tincture of Lavender.*	
Liquor Cresolis Saponatus ...	C.	*Linseed instead of Castor Oil, as P. Off. (p. 27), but other vegetable oil may be used to produce a 'suitable preparation.'*	
Liquor Ergosterolis Irradiati		*Contains a standard 'unit' strength of Antirachitic Activity per Gm.*	*Dose based on units.*
Liquor Iodi Fortis		*= Tinct. Iodi Fortis, B.P.'14.*	
Liquor Iodi Mitis	C.	*= Tinct Iodi Mitis with less Potassium Iodide.*	

		Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Liquor Iodi Simplex		*Intended as equivalent to Tinct. Iodi (sine Pot. Iod.) of Fr. Cx. The form has been criticised—v.p.* 508.	
Liquor Quininæ Ammoniatus		*Name changed from Tincture.*	
Liquor Sodæ Chlorinatæ Chirurgicalis		*Dakin's Solution containing not less than* 0·5% *available Cl. Cf. p.* 44 *and* 45. *The name is employed in U.S.X.*	
Liquor Sodii Chloridi Physiologicus		*To be autoclaved or Tyndallised and tested. Cf. p.* 759.	
Methylthioninæ Chloridum...		*As on p.* 325.	
Mistura Magnesii Hydroxidi...		*A suspension of Hydrated Magnesium Oxide. The writer's Magnesia Cream, p.* 538, *contains no added Magnesium Oxide. We found no advantage in the revised form.*	
Mistura Sennæ Composita ...	C.	*Fresh or Conc. Infusion of Senna Pods vice Infusion of Leaves, —v.p.* 884.	
Neoarsphenamina		*Cf. p.* 199.	*The dose given is* 2½ *to* 14 *grains. This is in round numbers* 0·15 *to* 0·9 *Gm.—a wide range. Cf. data on p.* 194 *and esp. p.* 197.
Nitrogenii Monoxidum ...		*Cf. p.* 142.	
Nux Vomica Pulverata ...		*Standardised to a definite content* (1·2%) *of Strychnine.*	
Oculenta		—	
Oleum Chenopodii		*Cf. p.* 848.	
Oleum Gossypii Seminis ...		*Cf. p.* 261.	
Oleum Hydnocarpi		*Cf. p.* 606.	
Oleum Hydnocarpi Æthylicum		*Cf. p.* 607.	
Oleum Santali Australiensis		*From Eucarya Spicata. Cheaper than that from S. album. Cf. p.* 620.	
Opium Pulveratum		*Other countries Officialise a powder containing* 10% *Morphine. This is in addition to 'Opium.'—v.p.* 622.	
Orthocaina		*Was introduced into Medicine as 'Orthoform New'—v.p.* 344.	
Oxygenium		*Cf. p.* 630.	
Pancreatinum		*Cf. p.* 634.	
Paraffinum Liquidum ...		*Viscosity not less than* 260. *Cf. our data on p.* 651.	
Pasta Zinci Oxidi Composita		*Contains Zinc Oxide, Starch and Soft Paraffin.*	
Phenobarbitonum		*Introduced to Medicine as Luminal. Cf. p.* 815.	

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Phenobarbitonum Solubile ...	*Introduced to Medicine as Luminal Sodium—v.p.* 816.	
Phenol Liquidum	C. *Now* 80% *w/w Phenol—was* 87% *nearly. Cf. our expts. p.* 16.	
Physostigminæ Salicylas ...	*Cf. p.* 685.	
Pilula Colocynthydis et Hyoscyami	C. *Formula altered.*	
Pilula Hydrargyri	C. *Syrup, etc., as excipient, instead of Conf. Rosæ.*	
Procainæ Hydrochloridum ...	*This is equivalent to Kerocain—v.p.* 345. *The name is in U.S.X.*	
Pulvis Effervescens Compositus	= *Seidlitz Powder, B.P.*'14.	
Pulvis Ipecacuanhæ et Opii...	C. = *Pulvis Ipecacuanhæ Compositus, B.P.*'14, *in strength but contains no Potassium Sulphate.*	
Pulvis Rhei Compositus ...	C. *Light and Heavy Magnesia, vice Light.—v.p.* 879. *Rhubarb content increased slightly.*	
Quinidinæ Sulphas	*Cf. p.* 714.	
Quininæ Bisulphas	*Cf. p.* 733.	
Quininæ et Æthylis Carbonas	*Cf. p.* 737.	
Quininæ Tannas	*Cf. p.* 734.	
Saccharum Solubile	*Cf. p.* 749.	
Serum Antidysentericum (Shiga)	*Made from serum containing specific immune principles. An antitoxic serum as distinct from antibacterial. Cf. p.* 912.	4,000 *to* 10,000 *units.*
Syrupus Ferri Iodidi	C. *Dilute Hypophosphorous Acid added to keep. It has been objected to. Cf. V. II.; Edn. XIX., p.* 79.	
Syrupus Ferri Phosphatis cum Quinina et Strychnina ...	C. *Strychnine Base and the new Acid. Phosp. Conc. used. Contains a proportion of Glycerin. Strength is reduced to about half, viz.,* 1/60 *gr. Strychnine Hydrochloride in* 1 *drachm. —v.p.* 418.	*Dose remains same.*
Syrupus Sennæ...	C. *Ext. Sennæ Liq. and Water replace Senna Leaves and Alcohol.*	
Sodii Citras	*The Salt contg.* $2H_2O$ *as in U.S.X. and referred to on p.* 766.	
Sodii Hydroxidum	*Cf. p.* 767.	
Spiritus Methylatus Industrialis	*Described as* 19 *vols. of* 95% *Alcohol with* 1 *vol. of approved Wood Naphtha and known as* 66 *O.P. Ind. Meth. Spt. For* 1930 *Regulations, see p.* 115.	
Strophanthin	*K—Strophanthin. Cf. p.* 782.	

	Notes as to strength, etc., and our reference page.	Remarks on dose, where differing markedly from that in the E.P.
Sulpharsphenamina ...	*Cf. p.* 191.	*The subcut. and intram. dose is given as* 1½ *to* 10 *grains, i.e.,* 0·1 *to* 0·6 *Gm. The data on p.* 200 *agree with this.*
Syrupus Ferri Phosphatis Compositus	*Cf. a revised formula published by A. C. Abraham, p.* 418.	
Syrupus Limonis	**C.** *Citric Acid and Syrup replace Lemon Juice and Sugar. Cf. p.* 864.	
Theophyllinæ et Sodii Acetas	*Cf. p.* 799.	
Thyroxinsodium	*Cf. p.* 977.	1/640 *to* 1/64 *gr.*
Thyroideum (Siccum) ...	*Standardised in terms of Thyroxin Iodine as P. Off—v.p.* 980.	
Tinctura Cardamomi Composita	**C.** *Alcohol* 60% *instead of* 45% *and Glycerin reduced.*	
Tinctura Cinchonæ	**C.** *Made from new soft Extract. Cf. p.* 294.	
Tinctura Cinchonæ Composita	**C.** *New soft Extract used.*	
Tinctura Colchici	**C.** *Liquid Extract diluted with Alcohol.*	
Tinctura Hyoscyami... ...	**C.** *Liquid Extract diluted with Alcohol.*	
Tinctura Ipecacuanhæ ...	*Liquid Extract diluted with Alcohol, Glycerin and Water. To replace ' Wine ' of B.P.'*14.	
Tinctura Opii Camphorata ...	= *Tinct. Camph. Co. The name is in U.S.X. Cf. p.* 627.	
Tinctura Quillaiæ	**C.** *Alcohol strength reduced.*	
Tinctura Rhei Composita ...	**C.** *Alcohol strength increased.*	
Tinctura Stramonii	**C.** *Now standardised to agree with U.S.X.—v.p.* 780.	
Totaquina	*Contains* 70% *cryst. alkaloids, of which not less than* 1/5*th is Quinine, as suggested by Malaria Commission—v.p.* 714.	
Toxinum Diphthericum Calefactum	*Schick control. Cf. Edn. XIX., V. II., p.* 538.	
Toxinum Diphthericum Detoxicatum	*Diphtheria Prophylactic. Cf. p.* 911.	
Toxinum Diphthericum Diagnosticum	*Schick Test Toxin. Cf. Edn. XIX., V. II., p.* 538.	
Trochiscus Krameriæ ...	**C.** *Dry Extract used.*	
Trochiscus Krameriæ et Cocainæ	**C.** *Dry Extract used.*	

	Notes as to strength, etc., and our r eference page.	Remarks on dose, where differing markedly from that in the E.P.
Trochiscus Morphinæ et Ipecacuanhæ	C. *Powdered Ipecacuanha used instead of root in powder.*	
Tro chiscus Phenolis	C. *Basis changed.*	
Tuberculinum Pristinum ...	*Tuberculin Old. Cf. p.* 927.	
Unguentum Acidi Tannici ...	*20% strength. It may replace Ung. Gallæ.*	
Unguentum Aquosum ...	*Hydrous Ointment as an odourless Cold Cream.*	
Unguentum Chrysarobini ...	C. *Unguentum Simplex instead of Soft Paraffin.*	
Unguentum Simplex... ...	*Contains Wool Fat, Hard Paraffin and White or Yellow Soft Paraffin.*	
Unguentum Sulphuris ...	C. *Unguentum Simplex instead of Adeps. Benzoatus.*	
Unguentum Hydrargyri Ammoniati	C. *Unguentum Simplex instead of Adeps Benzoatus.*	
Unguentum Hydrargyri Oleati		
Unguentum Hydrargyri Subchloridi		
Unguentum Paraffini ...	C. *Formula modified.* 2% *Wax instead of* 3%—*v.p.* 650.	
Unguentum Phenolis ...	C. *Basis changed, cf. p.* 19. *Now contains White Wax, Lard, Hard Paraffin and White Soft Paraffin.*	
Unguentum Zinci Oxidi ...	C. *Unguentum Simplex instead of Benz. Lard.*	
Urea	—	
Vaccinum Typho-Paratyphosum (T.A.B.)	*Cf. p.* 938.	
Vaccinum Vaccinæ	*Cf. p.* 938.	
Zinci Stearas	*Cf. p.* 600.	

ABBREVIATIONS.

When the reference is to a periodical, the number put first is the number of the volume; then follow the last two figures of the year, and the last number refers to the page, thus, B.M.J. i./32,250.

A.R.—List of Reagents for Analytical Purposes prepared by a Special Committee appointed by the Councils of the Institute of Chemistry of Great Britain and Ireland and the Society of Public Analysts and other Analytical Chemists.—London, 1915.

Allen.—Allen's Commercial Organic Analysis.—Edited by S. S. Sadtler, E. C. Lathrop, and C. A. Mitchell, 5th Edn., 1924–1930, 8 vols.; Vol. IX., 4th Edn., 1917, edited by W. A. Davis.

Am. Jl. Ph.—American Journal of Pharmacy.

Anal.—Analyst, W. Heffer and Sons, Ltd., 4, Petty Cury, Cambridge.

Arch. Radiol.—Archives of Radiology and Electrotherapy of the British Assoc. for Advancement of Radiol. and Physiother. See also 'J.R.S.'

B.C.A.—British Chemical Abstracts. Branch A—pure Chemistry—is issued monthly with the Journal of the Chemical Society, London.

B. & C.P.—British and Colonial Pharmacist, London, previously B. & C.D.

B.J.R.—The British Journal of Radiology, W. Heinemann, London. *See* J.R.S.

B.M.J.—British Medical Journal, London.

B.M.J.E.—British Medical Journal Epitome.

B.P.'14.—British Pharmacopœia 1914 (previously indicated, *Off.*).

B.P.'32.—British Pharmacopœia 1932.

B.Pt.—Boiling Point.

B.P.C.—British Pharmaceutical Codex, 1923.

B.P.C. 1894 or 1901.—Formulary of the British Pharm. Conference.

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C.R.—Changes proposed in the British Pharmacopœia by the International Agreement for the Unification of Pharmacopœial Formulas for Potent Drugs, Brussels, Nov. 29, 1906, from a report to the Pharmacopœia Committee of the General Medical Council. Adopted March 4, 1907. This Committee issued further reports in 1908, 1910, 1911. *cf.* F.I.

C.X.—Charing Cross Hospital Pharm., 1922.

Can. Form.—The Canadian Formulary of Unofficial Preparations.

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Clin. Jl.—Clinical Journal, London.

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D.M.W.—Deutsche Medizinische Wochenschrift. Leipzig.
℞.—Drugs or preparations coming within the scope of the Dangerous Drugs Acts, 1920 and 1923, and Consolidated Regulations, 1928.
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E.—Pharm. of Evelina Hospital, Southwark, 1906.
E.G.A.—Elizabeth Garrett-Anderson. Hosp. Pharmacopœia, 1926 and earlier Edns., Euston Road, London (formerly New Hospital for Women).
E.L.—Pharm. of East London Hospital for Children, 1929.
Ec.Prod.I.—Economic Products of India, 1889–96.
Ed.M.J.—Edinburgh Medical Journal.
Edition XIX.—Nineteenth Edition of this work (1928). For References and comments unavoidably deleted.
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F.E.—Farmacopea Española Octava Edicion, 1930. Madrid.
F.I.—Formula Internationalis, International Agreement for Unification of Formulas signed 1906—*cf.* C.R. *antea*. Also Agreement made at *Second* International Conference at Brussels 1925 as stated in Final Report and Preliminary Draft. (P.J. ii./25,547 ; i./26,56 ; see also P.J. i./26, 41,42,294 ; ii./26,734 ; ii./27,372.) This Agreement was signed by a number of States with and without reservations at Brussels, Aug. 20,'29. *See* Preface.
F.N.—Formulaire des Medicaments Nouveaux. Bocquillon-Limousin.
F. Norsk.—Den. Norske Farmakopϕ, 1913. Norwegian Pharmacopœia.
Fr. Cx.—Codex Medicamentarius Gallicus, Pharmacopée Francaise. Paris, 1908, Matson et-Cie, 120, Boulevard Saint Germain.
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G.N.C.—Pharm. Gt. Northern Central Hospital, 1908. (See also R.N.H.)
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I.D.C.—Indigenous Drugs Committee, 2nd Report, Simla, 1909. Third Report, Calcutta, 1916.
I.M.G.—Indian Medical Gazette.
I.V.—Iodine Value.
Int. Conf. Trop. Am.—Proceedings of the International Conference on Health Problems in Trop. America, 1924, United Fruit Co., Boston.
Int. Cong.—VIIth International Congress of Applied Chemistry, London, May, 1909 (papers read at); also VIIIth Congress, Washington, 1912.
J.C.S.A.—Jl. of the Chem. Soc. Abstracts. London. See also B.C.A.
J.C.S.T.—Journal of the Chemical Society. Transactions. London.
J.R.S.—Journal of the Roentgen Society, London, and as from Jan. 1924 "The British Jl. of Radiology, Rontgen Society Section, incorporating the Jl. of the Rontgen Society." See also Arch. Radiol.
Jl. A.M.A.—Journal American Medical Association, Chicago.
Jl. Am. Ph.A.—Journal of the American Pharmaceutical Association.
Jl. Ph. and Exp. Ther.—The Journal of Pharmacology and Experimenta Therapeutics. Edited by J. J. Abel (The Johns Hopkins University, and Walter E. Dixon (University of Cambridge), Baltimore and London).
Jl. R.A.M.C.—Journal of the Royal Army Medical Corps (Mthly.).
Jl. R.N.M.S.—Journal of the Royal Naval Medical Service (Qtrly.).
Jl. Trop. Med.—Journal of Tropical Medicine and Hygiene, London.
K.C.H.—King's College Hospital Pharmacopœia, 1927.
Knox.—Radiography & Radio-Therapeutics, by Robert Knox. 4th Edition in 2 vols. (Vol. II, completed and edited by W. M. Levitt, 1923–32).
L.—The Lancet, London.
L.H.—Pharmacopœia of the London Hospital, 1925 and earlier Edns.
L.L.—London Lock Hospitals Pharmacopœia, 1919.
M.—Annual Report of E. Merck.
M. & R.—R. Muir and J. Ritchie, Manual of Bacteriology, 9th Edition, 1932 and earlier issues.
M.A.—Medical Annual.
M.Pt.—Melting Point.
M.R.C. or Med. Res. Counc.—Medical Research Council (formerly Med. Res. Committee, National Health Insurance, now incorporated by Royal Charter, York Buildings, Adelphi, W.C. 2, and Nat. Inst. Med. Research, Hampstead, N.W. 3, London.
m.a.—Milliampere.
M.P.C.—The Medical Press and Circular, London.
M. Index.—Merck's Index, 5th Edn., 1927, Darmstadt.
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Na.—"Nature," London.
N.E.H.—Pharm. of the North-Eastern Hosp. (now called Queen's Hosp. for Children), 1927, and earlier issues.
N.F.—National Formulary of Unofficial Preparations issued by the Am. Pharm. Ass., 4th Edn., 1916 (pubd. 1919), and 5th Edn., 1926.
N.H.I.—National Formulary for National Health Insurance Purposes, with 1930 alterations. Issued by the B.M.A. for the National Insurance. Defence Trust.

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N.N.R.—New and Non-official Remedies, Amer. Med. Assn. 1931 and earlier issues.
N.S.D.—National Standard Dispensatory in accordance with U.S. VIII.
Newth.—G. S. Newth, Test Book of Inorganic Chemistry, Revised Edition, 1923.
O.R.—Optical Rotation of Essential Oils (100 m.m. tube) at 20° C.
P.G.V.—Pharmacopœa Germanica, 5th Edition, 1910.
P.G. VI.—Deutsches Arzneibuch, 6th Edn., 1926.
P.I.—Pharmacopœia of India, 1868.
P.J.—Pharmaceutical Journal and Pharmacist, London.
P.J.F.—Pharmaceutical Journal Formulary.
P.L.—Pharmacopœia Londinensis, 1851.
P.M.C.E.—Select Parliamentary Committee on Proprietary Medicines Enquiry, 1912–1913.
P.N.F.—Proposed National Formulary (U.S.).
P. Off.—Proposed Official recommendations as embodied in Pharmacopœia Commission Reports of Sub-Committees issued by General Medical Council 1930 onwards.
P.R.—Perfumery and Essential Oil Record. London.
P.R.S.M.—Proceedings of the Royal Society of Medicine, London.
℗1.—Part I. Poisons Schedule, 1908. *See* Vol. I. E.P. Edn. XIX., p. 998.
℗.—Part II. Poisons Schedule, 1908. *See* Vol. I. E.P. Edn. XIX., p. 999.
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R.—Handbook of Therapeutics, by Sydney Ringer and Harrington Sainsbury, 13th Edition, 1897 and earlier issues.
R.D.H.—Pharm. of Royal Dental Hospital, London, 1926.
R.F.H.—Pharmacopœia of the Royal Free Hospital, London, 1922.
R.I.—Refractive Index.
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T.H.—Pharmacopœia of the Hospital for Diseases of the Throat, 1914.
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✱In connection with a text heading signifies that the name which it precedes is a British Registered Trade Mark, *e.g.*, ✱Exalgine. The ✱ is only applied to the principal heading and is not repeated throughout the book.

WEIGHTS AND MEASURES.

Within the Empire a dual system of Weights and Measures is commonly employed, *viz.*, the **Metric** and the **Imperial.** In making pharmaceutical preparations and in analytical work the former is chiefly used, but in matters relative to prescribing it is to some extent unfortunate that we do not come into line with other countries.

The continued use of the Imperial System, when speaking of small doses, *e.g.*, $\frac{1}{200}$ grain, $\frac{1}{100}$ grain, etc., has, it is true, a little in its favour in place of the more cumbersome 0·0003 Gm. and 0·0006 Gm., but this is only a matter of usage and on broad lines the existence of a dual system cannot be commended for pharmacopœial requirements.

The incessant rapid calculations needed by the pharmacist in transposing from one type of figures to the other are irritating and they should be prevented whenever possible as they constitute a possible source of error.

Certainly it is gratifying that during the last ten years or so *Metric Measures have markedly superseded the Imperial System* for all purposes relative to medicinal treatment.

Metric Measures in the *B.P.* '32 are to be graduated at 15° while by the Weights and Measures Act (1878) Imperial Measures are graduated at 16·7° C. (62° F.).

For determining **Specific Gravities** the temperature 15·5° C. (60° F.), is used in the British Pharmacopœia. The recently issued P. Ital. V., P. Belg. IV. and F.E. VIII. specify 15° unless otherwise stated. U.S.X. employs mostly 25° C.

The Board of Trade, May 1, 1908, recognised the word 'mil' as a short official designation for the millilitre, 'decimil' for $\frac{1}{10}$ of a millilitre, and 'centimil' for $\frac{1}{100}$ of a millilitre. These terms have been used in the British Pharmacopœia.

In our pages formulæ are given in 'proportional parts,' solids by weight, and liquids by *measure*, as the dispensing of liquids in Great Britain is always conducted by measuring. Exceptions to this rule are always made clear in the text. In those, therefore, in which 'proportional parts' are used, the quantities of solids and liquids may be taken respectively in grammes and cubic centimetres, ounces and fluid ounces, grains and (to be strictly accurate) grain measures, but minims in place of the latter will often be used, and only cause one-eleventh *minus* error.

In the body of the work (but not always in the Supplementary List of Drugs or in the Index) the approximate doses of each drug and preparation in terms of the metric system follow those of the Imperial System. For all practical purposes, a fluid drachm may be considered as 4 cubic centimetres; 60 grains as 4 grammes; the avoirdupois ounce (about $28\frac{1}{3}$ grammes) may be taken as 30 grammes; the fluid ounce as 30 cubic centimetres; and the pound avoirdupois as half a kilogramme (approximately it is nine-twentieths).

In using the metric system, prescribers may consider the British grain as 60 milligrammes (nearer 0·065 Gm.), $1\frac{1}{2}$ grains as 0·1 Gm., and 15 minims (nearer 17 minims) as approximately 1 cubic centimetre. (See table, pp. xlii and xliii.) *Note.*—U.S.X. also makes 15 minims equivalent to the Cc.

The following approximations will also be useful :—

80 minims	= 5 Cc.*	= 1 teaspoon.
240 minims	= 15 Cc.*	= 3 teaspoons. / 1 tablespoon.
960 minims	= 60 Cc.	= 12 teaspoons. / 4 tablespoons. / 1 wineglass.
250 Cc.	= 50 teaspoons	= 16 tablespoons (about). / 4 wineglasses. / 1 tumbler.

The word gramme (preferably shortened to **Gram**), is contracted to **Gm.**, and the words cubic centimetre to **Cc.** The contraction **Gm.** in heavy type and with a capital initial letter distinguishes it from gr., the usual (though dangerous) contraction for grain. The latter is only used in our pages in the index for sake of brevity.

By Article 9 of the International Agreement respecting the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels on Aug. 20, 1929, the contracting parties adopt a **Standard Drop-bottle** which gives (at the temperature of 15° C.) 20 drops of distilled water per **Gm.**

Farmacopea Oficial Española VIII. and the French Codex give very complete Drop Measure Tables.

The sizes of bottles in most frequent use in France are :—

1,000, 500, 250, 200, 125, 100, 50, and 25 cubic centimetres.

Mixtures may be prescribed in 125, 200, 250, or 500 Cc. and drops should be ordered in quantities of 15, 30, and 60 Cc.

Solubilities are taken at 15·5° C.

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Metric System in prescribing. Useful general summary.—B.M.J. i./22,400. See also W. C. Sillar, L. i./22,469,492.

Gm. and Cc. (for gramme and millilitre) would save unnecessary printing in the B.P.—D. B. Dott, P.J. i./30,214.

Suggested reforms by modifying Metric System and introducing **Minpar**, a new equivalent unit of weight—480 to the ounce avoir.—T. J. Smith, P.J. i./30,238.

Anomalous Weights and Measures. Major R. I. Tasker, Chairman L.C.C. in his Presidential Address to the Incorporated Society of Inspectors, pointed to the large expenditure of public money spent on verification of Standards. The 'reputed quart' contains two-thirds of the Imperial Quart.—P.J. ii./30,214.

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* These quantities are respectively those recognised by the FR. CX. for a coffee spoonful (teaspoonful) and a tablespoonful (Cuillerée à Soupe).

According to the P. BELG.—

La cuillerée à café holds 4 Gm. of water.
La cuillerée à dessert holds 10 Gm. of water
La cuillerée à bouche ou à Soupe holds 15 Gm. of water.
} as also in FR. CX.

Generally speaking :—

One teaspoon	=	4 Cc.
One dessertspoon	=	8 Cc.
One tablespoon	=	15 to 16 Cc.

METRIC WEIGHTS AND MEASURES AND THEIR EQUIVALENTS.

1 Gramme (or Gram.) (Gm.)	=15·4323564 grains.
1 Centigramme (Cgm.)	= 0·154323 grain.
1 Milligramme (Mgm.)	= 0·015432 grain.
1 Litre	=35·196 fluid ounces.
1 Cubic Centimetre (Cc.)	=16·9 minims (nearly).
1 Metre	=39·370113 inches.

The Gramme has its decimal multiples—Dekagramme, Hectogramme, and Kilogramme; and divisions—Decigramme, Centigramme, and Milligramme. The Litre and Metre have their corresponding decimal divisions—Decilitre, Centilitre, and Millilitre,—and Decimetre, Centimetre, and Millimetre.

In Continental States, where this system is now generally adopted for the dispensing and preparing of medicines, all liquids are weighed, and the terms Gramme, Centigramme, and Kilogramme only are used. This avoids the possibility of errors, which the similarity of the names Decagramme and Decigramme might lead to, but if the Greek prefix *deka* were always spelt with a *K* this possibility of error would not exist.

Furthermore, the quantities of the ingredients in prescriptions are sometimes written in decimal proportions, the gramme being understood to be the unit; the name of the integer is generally not mentioned thus:

Rhubarb 35· means 35 grammes of Rhubarb
„ ·035 „ 35 milligrammes

The following abbreviations are officially used in all French educational establishments:—

Myriamètre, mam	Decistère, ds	Kilolitre, kl
Kilomètre, km	tonne, t	Hectolitre, hl
Héctomètre, hm	Quintal métrique, q	Dékalitre, dal
Dékametre, dam	Kilogramme, kg	Litre, l
Métre, m	Hectogramme, hg	Décilitre, dl
Decimètre, dm	Dékagramme, dag	Centilitre, cl
Centimètre, cm	Gramme, g	Millilitre, ml
Millimètre, mm	Décigramme, dg	Hectare, ha
Dékastère, das	Centigramme, cg	Are, a
Stère, s or m^3	Milligramme, mg	Centiare, ca or m^2

PERCENTAGE AND GRAINS PER FLUID OUNCE EQUIVALENTS.

Where **Percentage Solutions** are mentioned, it is intended that 100 Cc. shall contain *n* Gm. or that 100 grain-measures of the finished solution shall contain *n* grains of the substance, *e.g.*, a 50 per cent. solution of Cocaine Hydrochloride will contain 50 Gm. in 100 Cc. or 50 grains in 100 grain-measures.

%	Grains per fluid ounce	%	Grains per fluid ounce	%	Grains per fluid ounce
10·0	43·75	4·5	19·7	1·4	6·1
9·5	41·56	4·0	17·5	1·3	5·7
9·0	39·4	3·5	15·3	1·2	5·25
8·5	37·2	3·0	13·1	1·1	4·8
8·0	35·0	2·5	10·95	1·0	4·4
7·5	32·8	2·0	8·75	0·9	3·95
7·0	30·6	1·9	8·3	0·8	3·5
6·5	28·45	1·8	7·9	0·7	3·05
6·0	26·25	1·7	7·45	0·6	2·6
5·5	24·05	1·6	7·0	0·5	2·2
5·0	21·9	1·5	6·55	0·4	1·75

APPROXIMATE EQUIVALENTS.

WEIGHTS. IMPERIAL TO METRIC.

grain.	Gm.
$\frac{1}{1000}$	= 0·000065
$\frac{1}{200}$	= 0·0003
$\frac{1}{100}$	= 0·0006
$\frac{1}{64}$	= 0·001
$\frac{1}{50}$	= 0·0013
$\frac{1}{40}$	= 0·0015
$\frac{1}{32}$	= 0·002
$\frac{1}{25}$	= 0·0025
$\frac{1}{20}$	= 0·003
$\frac{1}{16}$	= 0·004
$\frac{1}{12}$	= 0·005
$\frac{1}{10}$	= 0·006
$\frac{1}{8}$	= 0·008
$\frac{1}{6}$	= 0·01
$\frac{1}{5}$	= 0·012

grain.	Gm.
$\frac{1}{4}$	= 0·016
$\frac{1}{3}$	= 0·02
$\frac{1}{2}$	= 0·03
$\frac{3}{4}$	= 0·05
1	= 0·06
grains	
$1\frac{1}{2}$	= 0·1
2	= 0·12
3	= 0·2
4	= 0·25
5	= 0·3
6	= 0·4
8	= 0·5
10	= 0·6
12	= 0·8

grains.	Gm.
15	= 1·0
20	= 1·2
30	= 2·0
45	= 3·0
60	= 4·0
90	= 6·0
120	= 8·0
150	= 10·0
180	= 12·0
$\frac{1}{2}$ ounce (av.)	= 15·0
1 ,,	= 30·0
(or nearer 28·35.	
1 pound	= 453·59

WEIGHTS. METRIC TO IMPERIAL.

1 kilogramme	= 2 lb. $3\frac{1}{4}$ oz.
500 Gm.	= 1 ,, $1\frac{5}{8}$,,
100 ,, ...	= $3\frac{1}{2}$ oz.
25 ,, ...	= $\frac{7}{8}$,,
10 ,, ...	= $\frac{1}{3}$,,
1 ,, ...	= 15·43 grains.
$\frac{1}{2}$,, or 500 milligrammes	= 7·7 ,,

MEASURES. IMPERIAL TO METRIC.

minim.	Cc.
$\frac{1}{2}$	= 0·03
1	= 0·06
minims.	
2	= 0·12
3	= 0·2
4	= 0·25
5	= 0·30
6	= 0·4
8	= 0·5
10	= 0·6
12	= 0·8

minims.	Cc.
15	= 1·0
20	= 1·2
25	= 1·5
30	= 2·0
40	= 2·5
45	= 3·0
60	= 4·0
90	= 6·0
120	= 8·0
240	= 15·0

fluid oz.	Cc.
1	= 30·0
fluid ozs.	
2	= 60·0
4	= 115·0
5	= 140·0
6	= 170·0
8	= 230·0
10	= 280·0
20	= 568·0
gallon	litres.
1	= 4·536

MEASURES. METRIC TO IMPERIAL.

1 Cc.	= 15 (nearer 17) minims.
1 litre	= 1 pint 15 fl. oz. approx.

MEASURES OF LENGTH.

1 micromillimetre	= $\frac{1}{1000000}$ millimetre, usually represented by $\mu\mu$.
1 micron	= $\frac{1}{1000}$ millimetre, or 1 micrometre, ,, ,, μ.
1 millimetre	= 0.03937 inch.
1 centimetre	= 0·3937 inch.
1 decimetre	= 3.937 inches.
1 metre	= 39·370113 inches or 1 yard 3·37 inches nearly.

NEUTRALISATION TABLE.

	10 grains neutralise	Citric Acid grains.	Tartaric Acid grains.
Ammonium Carbonate		13	14
Magnesium Carbonate		14	16
Potassium Bicarbonate		7	$7\frac{3}{4}$
Sodium Bicarbonate		$8\frac{1}{2}$	9
Sodium Carbonate ($+10\ H_2O$)		5	$5\frac{1}{4}$

Lemon Juice (freshly expressed from *Citrus Medica var. B. Limonum*) contains from 30 to 40 grains Citric Acid per ounce. A good lemon yields on average an ounce of juice.

Arithmetical Memoranda.

Ratio of circumference of a circle to its diameter $= \pi = 3{\cdot}14159$. Circumference of a circle $= 2\ \pi$ r. Area of a circle $= \pi\ r^2$.

Area of a Triangle with base a and height $h = \frac{1}{2}\ a\ h$.
Volume of a Cube with length $l = l^3$.

Volume of a Cylinder $= \pi\ r^2\ h$. If r and h be in inches, this divided be 277·278 the result is in gallons (water).

Volume of a Cone $= \dfrac{\pi\ r^2\ h}{3}$ Volume of a Sphere $= \dfrac{4}{3}\pi\ r^3$

A gallon of Water weighs 10 pounds ; 1 gallon contains 277·278 cubic inches.

A '**Corbyn**' = 40 ounces fluid (1 quart).
A '**Winchester**' quart = 80 ounces fluid ($\frac{1}{2}$ gallon).

Lead and Arsenic Calculations.

50 parts in 1,000,000 =
1 in 20,000 = 0·005%
$\frac{1}{100}$ grain per lb. = approx. 1·4 parts per million.

1%	= 1 in 100
0·1%	= 1 in 1,000
0·01%	= 1 in 10,000
0·001%	= 1 in 100,000
0·0001%	= 1 in 1,000,000
0·0050%	= 50 in 1,000,000

WATER ANALYSIS TRANSPOSITIONS.

To transpose grains per gallon into parts per million multiply by $\frac{100}{7}$

To transpose grains per gallon into parts per 100,000 multiply by $\frac{10}{7}$

To transpose parts per million into grains per gallon, multiply by $\frac{7}{100}$

To transpose parts per 100,000 into grains per gallon, multiply by $\frac{7}{10}$

RELATION OF VOLUME TO MASS.

1 minim = the volume at 16·7° C. of 0·9114583 grains of water.
1 fluid drachm = the volume at 16·7° C. of 54·6875 grains of water.
1 fluid ounce = the volume at 16·7° C. of 437·5 grains of water.
109·7143 minims (taken as 110 minims) = the volume at 16·7° C. of 100 grains of water.

CALCULATION OF A DOSE *FOR MAN* FROM KNOWN DOSE *FOR AN ANIMAL.*

The Rate of Catabolism of an animal is not proportional to size or weight but approximately to the body surface. Surfaces of solids of the same shape are proportional to the two-thirds power of their volumes (*i.e.*, the cube root of the square of the volumes). Since the specific gravity of animals varies only slightly, their body surface is a function of the two-thirds power of their weight. This relation is expressed by **Meeh's Formula,** $S = k(W)^{\frac{2}{3}}$, where S is the surface in square centimetres, W is the weight in grammes, and k is a factor which is nearly constant for all animals of the same shape. (See Armsby's " Nutrition of Animals "—Macmillan).

(Rubner gives the following values for k: Man, 12·3; Dog, 10·3—11·2; Rabbit, 12·0—12·9; Cat, 9·9; Guinea Pig, 10·5.)

A formula for calculating the dose for man. This assumes that k, the factor, is the same for man and animals, and is approximate only, as the values actually differ somewhat.

If the dose for man and the animal should be proportional to their rates of catabolism, *i.e.*, to their body surface, then:

$$\frac{D_M}{D_A} = \frac{S_M}{S_A} = \frac{K(M)^{\frac{2}{3}}}{K(A)^{\frac{2}{3}}}$$

D_M = Dose for man in Gm.
D_A = Dose for adult test animal in Gm.
S_M = Body surface of man.
S_A = Body surface of animal.
M = Wt. of man in Gm.
A = Wt. of test animal in Gm.

$$\text{Hence } D_M = \frac{M)}{(A)^{\frac{2}{3}}} \times D_A = \frac{1590 \times D_A}{(A)^{\frac{2}{3}}}$$

for a 10-stone (63·5 kilo) man.

Thus, a dose of 1 Gm. per kilo for an animal *is equivalent to* 15·9 *Gm., not* 63·5 *Gm.*, for a 10-stone man.

No exact method of calculating the corresponding dose for man from that of an animal is known. The figure obtained by the above formula is useful as a guide, but allowance must still be made for the fact that man may be more sensitive to the drug than the animal.

TRANSPOSITION TABLE OF DOSES STATED FOR MAN IN MGR. PER KILO. TO MAN'S WEIGHT.

Mgr. per Kilo.								
1	=	1	grain	(0·065 Gm.)	for a 10-stone	(63 5 kilo)	man
5	=	5	,,	(0·32 Gm.)	,,	,,	,,	,,
10	=	10	,,	(0·64 Gm.)	,,	,,	,,	,,
50	=	50	,,	(3·20 Gm.)	,,	,,	,,	,,

As 5 mgr. per kilo more nearly = 4·9 grains (0·318 Gm.) per 10-stone man, the above figures contain a 2% *error in excess.*

THERMOMETRIC EQUIVALENTS.

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
—	—	9	48·2	62	143·6	117	242·6	172	341·6	227	440·6
40	40·0	10	50·0	63	145·4	118	244·4	173	343·4	228	442·4
39	38·2	11	51·8	64	147·2	119	246·2	174	345·2	229	444·2
38	36·4	12	53·6	65	149·0	120	248·0	175	347·0	230	446·0
37	34·6	13	55·4	66	150·8	121	249·8	176	348·8	231	447·8
36	32·8	14	57·2	67	152·6	122	251·6	177	350·6	232	449·6
35	31·0	15	59·0	68	154·4	123	253·4	178	352·4	233	451·4
34	29·2	16	60·8	69	156·2	124	255·2	179	354·2	234	453·2
33	27·4	17	62·6	70	158·0	125	257·0	180	356·0	235	455·0
32	25·6	18	64·4	71	159·8	126	258·8	181	357·8	236	456·8
31	23·8	19	66·2	72	161·6	127	260·6	182	359·6	237	458·6
30	22·0	20	68·0	73	163·4	128	262·4	183	361·4	238	460·4
29	20·2	21	69·8	74	165·2	129	264·2	184	363·2	239	462·2
28	18·4	22	71·6	75	167·0	130	266·0	185	365·0	240	464·0
27	16·6	23	73·4	76	168·8	131	267·8	186	366·8	241	645·8
26	14·8	24	75·2	77	170·6	132	269·6	187	368·6	242	467·6
25	13·0	25	77·0	78	172·4	133	271·4	188	370·4	243	469·4
24	11·2	26	78·8	79	174·2	134	273·2	189	372·2	244	471·2
23	9·4	27	80·6	80	176·0	135	275·0	190	374·0	245	473·0
22	7·6	28	82·4	81	177·8	136	276·8	191	375·8	246	474·8
21	5·8	29	84·2	82	179·6	137	278·6	192	377·6	247	476·6
20	4·0	30	86·0	83	181·4	138	280·4	193	379·4	248	478·4
19	2·2	31	87·8	84	183·2	139	282·2	194	381·2	249	480·2
18	0·4	32	89·6	85	185·0	140	284·0	195	383·0	250	482·0
17·778	0·0	33	91·4	86	186·8	141	285·8	196	384·8	251	483·8
		34	93·2	87	188·6	142	287·6	197	386·6	252	485·6
—	+	35	*95·0	88	190·4	143	289·4	198	388·4	253	487·4
17	1·4	36	96·8	89	192·2	144	291·2	199	390·2	254	489·2
16	3·2	37	98·6	90	194·0	145	293·0	200	392·0	255	491·0
15	5·0	37·5	99·5	91	195·8	146	294·8	201	393·8	256	492·8
14	6·8	38	100·4	92	197·6	147	296·6	202	395·6	257	494·6
13	8·6	39	102·2	93	199·4	148	298·4	203	397·4	258	496·4
12	10·4	39.5	103·1	94	201·2	149	300·2	204	399·2	259	498·2
11	12·2	40	104·0	95	203·0	150	302·0	205	401·0	260	500·0
10	14·0	41	105·8	96	204·8	151	303·8	206	402·8	261	501·8
9	15·8	42	107·6	97	206·6	152	305·6	207	404·6	262	503·6
8	17·6	43	109·4	98	208·4	153	307·4	208	406·4	263	505·4
7	19·4	44	*111·2	99	210·2	154	309·2	209	408·2	264	507·2
6	21·2	45	113·0	100	212·0	155	311·0	210	410·0	265	509·0
5	23·0	46	114·8	101	213·8	156	312·8	211	411·8	266	510·8
4	24·8	47	116·6	102	215·6	157	314·6	212	413·6	267	512·6
3	26·6	48	118·4	103	217·4	158	316·4	213	415·4	268	514·4
2	28·4	49	120·2	104	219·2	159	318·2	214	417·2	269	516·2
1	30·2	50	122·0	105	221·0	160	320·0	215	419·0	270	518·0
0	32·0	51	123·8	106	222·8	161	321·8	216	420·8	271	519·8
		52	125·6	107	224·6	162	323·6	217	422·6	272	521·6
+	+	53	127·4	108	226·4	163	325·4	218	424·4	273	523·4
1	33·8	54	129·2	109	228·2	164	327·2	219	426·2	274	525·2
2	35·6	55	131·0	110	230·0	165	329·0	220	428·0	275	527·0
3	37·4	56	132·8	111	231·8	166	330·8	221	429·8		
4	39·2	57	134·6	112	233·6	167	332·6	222	431·6	* Clinical Limits.	
5	41·0	58	136·4	113	235·4	168	334·4	223	433·4		
6	42·8	59	138·2	114	237·2	169	336·2	224	435·2		
7	44·6	60	140·0	115	239·0	170	338·0	225	437·0		
8	46·4	61	141·8	116	240·8	171	339·8	226	438·8		

The Reaumur scale (with zero at freezing point of water and the boiling point of water being 80°) is now little used.

To convert C. into F. multiply by $\frac{9}{5}$ and add 32. To transpose F. into C. subtract 32 and multiply by $\frac{5}{9}$. To convert C. into R. multiply by $\frac{4}{5}$. To convert R. into C. multiply by $\frac{5}{4}$. To convert F. into R. subtract 32 and multiply by $\frac{4}{9}$. To convert R. into F. multiply by $\frac{9}{4}$ and add 32.

INTERNATIONAL (1932) ATOMIC WEIGHTS.

The Molecular Weights of Compounds in the book are now given in terms of the following Atomic Weights as issued by the Committee on Atomic Weights of the International Union of Chemistry in their Second Report.—Ref. P.J., Apl. 30, 1932.

—	Symbol.	Atomic Weight.	—	Symbol.	Atomic Weight.
Aluminium ..	Al	26·97	Molybdenum ..	Mo	96·0
Antimony ..	Sb	121·76	Neodymium ..	Nd	144·27
Argon	A	39·944	Neon	Ne	20·183
Arsenic	As	74·93	Nickel ..	Ni	58·69
Barium	Ba	137·36	Nitrogen ..	N	14·008
Beryllium ..	Be	9·02	Osmium ..	Os	190·8
Bismuth ..	Bi	209·00	Oxygen ..	O	16·0000
Boron	B	10·82	Palladium ..	Pd	106·7
Bromine ..	Br	79·916	Phosphorus ..	P	31·02
Cadmium ..	Cd	112·41	Platinum ..	Pt	195·23
Calcium.. ..	Ca	40·08	Potassium ..	K	39·10
Carbon ..	C	12·00	Praseodymium.	Pr	140·92
Cerium	Ce	140·13	Radium ..	Ra	225·97
Cesium	Cs	132·81	Radon ..	Rn	222
Chlorine ..	Cl	35·457	Rhenium ..	Re	186·31
Chromium ..	Cr	52·01	Rhodium ..	Rh	102·91
Cobalt	Co	58·94	Rubidium ..	Rb	85·44
Columbium ..	Cb	93·3	Ruthenium ..	Ru	101·7
Copper ..	Cu	63·57	Samarium ..	Sm	150·43
Dysprosium ..	Dy	162·46	Scandium ..	Sc	45·10
Erbium ..	Er	167·64	Selenium ..	Se	79·2
Europium ..	Eu	152·0	Silicon ..	Si	28·06
Fluorine ..	F	19·00	Silver	Ag	107·880
Gadolinium ..	Gd	157·3	Sodium ..	Na	22·997
Gallium ..	Ga	69·72	Strontium ..	Sr	87·65
Germanium ..	Ge	72·60	Sulfur	S	32·06
Gold	Au	197·2	Tantalum ..	Ta	181·4
Hafnium ..	Hf	178·6	Tellurium ..	Te	127·5
Helium	He	4·002	Terbium ..	Tb	159·2
Holmium ..	Ho	163·5	Thallium ..	Tl	204·39
Hydrogen ..	H	1·0078	Thorium ..	Th	232·12
Indium	In	114·8	Thulium ..	Tm	169·4
Iodine ..	I	126·932	Tin	Sn	118·70
Iridium ..	Ir	193·1	Titanium ..	Ti	47·90
Iron	Fe	55·84	Tungsten ..	W	184·0
Krypton ..	Kr	83·7	Uranium ..	U	238·14
Lanthanum ..	La	138·90	Vanadium ..	V	50·95
Lead	Pb	207·22	Xenon ..	Xe	131·3
Lithium ..	Li	6·940	Ytterbium ..	Yb	173·5
Lutecium ..	Lu	175·0	Yttrium ..	Y	88·92
Magnesium ..	Mg	24·32	Zinc	Zn	65·38
Manganese ..	Mn	54·93	Zirconium ..	Zr.	91·22
Mercury ..	Hg	200·61			

Isotopes.—*For a consideration of these see Vol. II.*

The author would welcome any suggestions regarding the subject matter or arrangement of the work, from Medical Men, Pharmacists, or Analysts

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ACACIÆ GUMMI.

Syn. ACACIA U.S. X., GOMME ARABIQUE, GOMME DU SÉNÉGAL, FR. Cx., P. Belg. IV., P. Ital. V., F. E. VIII.

A gummy exudate from A. Senegal, *Willdenow* (*N.O. Leguminosæ*), and other species, either colourless or with yellowish tint.—*B.P.* '14.

The gum consists, in the main, of a mixture of Alkali Arabinates.

Soluble almost completely in water: insoluble in Alcohol.

As ***emulsifying agent*** for oils, Powdered Gum Acacia is used, *e.g.*, in Mistura Olei Ricini (*B.P.* '14), the usual proportion being about 1 of Gum to 4 of oil. Less suffices in some cases. For suspending resinous ingredients of Tinctures *vide* Tincturæ. For its use as a pill excipient, *vide* Pilulæ.

Mucilago Acaciæ (*B.P.* '14).—Gum Acacia 4, washed to remove any adherent dust, dissolved in water 6. This quantity measures about $8\frac{3}{4}$. Benzoic Acid 0·1% added will keep it.

Incompatibles.—Alcohol, Mineral Acids, Borax, Ferric Salts, Oxalic Acid and most Lead Salts. Bismuth Carbonate should not be suspended with Acacia Mucilage. Tragacanth answers better.

Mucilago, U.S. Contains Gum Acacia 35, Sodium Benzoate 0·1, Water to 100.

Potion Gommeuse. FR. CX. Gum Acacia Powder 1, Syrup 3, Orange Flower Water 1, Water 10, parts by weight.

Gum Acacia Solution for Intravenous Injection. *Syn.* SOLUTIO SALINA CUM ACACIA, U.C.H. AND ST. TH. H. (6% Gum); INJECTIO SALINÆ ET GUMMI ACACIÆ, R.N.H. (7% GUM).

Gum Acacia 70 Gm., Sodium Chloride 9 Gm., Water to 1 litre. The solution to be sterilised after straining through fine linen. The addition of any antiseptic is not desirable.

Gum Acacia Sterules are prepared.

The contents of one Sterule, diluted to 250 Cc. with boiled water, produces a 7% injection in Normal Saline.

Uses.—To raise blood pressure after loss of blood, *e.g.*, from a wound of the femoral artery. Many such cases could be saved if the blood pressure could be kept up for 24 hours or so. The solution has the same viscosity as the blood and a content of colloids with osmotic pressure equal to that of the blood, hence after its injection there is little tendency for water to pass into the tissues. Large quantities may be used.

In surgical shock the method has been found of great value.

Solutions of 5% or over will restore permanently the low arterial pressure due to loss of blood.—Sir W. M. Bayliss, B.M.J. i./17,564; ii./17,808; i./18,553; i./19,262. Jl. Ph. & Exp. Ther., Mar. 1920, p. 29.

Gelatin 2% has also been suggested.—Med. Res. Counc., B.M.J. i./17,383.

The balance of Colloid and Crystalloid in cholera, shock and allied conditions. —B. Moore, B.M.J. ii./19,490.

The increase in blood volume caused, enables the heart to send on a large volume. When the total volume of blood is deficient the tissues suffer from want of Oxygen though the blood may be of normal constitution. Normal Saline was first proposed, but it disappears from the circulation in 20 to 30 minutes. A colloid with an osmotic pressure equal to that of the blood colloids must be added. Good gum answers the purpose well.—Sir W. M. Bayliss, L. i./23,575.

Considerable nutritive value, suitable for transfusion purposes in lieu of Ringer's Solution or Dextrose.—Nakaschima, Jl.A.M.A. i./29,1643.

OBSTETRIC SHOCK treated with definite benefit. Many lives saved by early use. Should be employed more extensively.—L. M. Randall, Jl.A.M.A. ii./29,847.

Need for blood transfusion often obviated at the Mayo Clinic. No injurious effects on kidneys, no harmful chemical changes in blood, no harmful alterations in physiologic process, no pathologic changes demonstrated at necropsy. Six days usually required to rid blood of Acacia.—L. D. Huffmann, Jl.A.M.A. ii./29,1698.

DIABETIC COMA. Desperate cases recovered with large quantities of intravenous fluid—hypertonic Saline and Gum Acacia solution (7%).—R. D. Lawrence, B.M.J., i./30,690.

A means of restoring volume far more available than **Blood Transfusion** (*q.v.*).—Lionel J. Picton, B.M.J. ii./30,664.

3% Gum Acacia and 1% Glucose used.—C. F. M. Saint, B.M.J. i./18,473.

Serum Colloidale Completum. *Syn.* SUERO COLOIDAL COMPLETO, F.E. VIII.

Gum Arabic 70 Gm., Sodium Chloride 8 Gm., Potassium Chloride 0·2 Gm., Calcium Chloride 2 Gm., Magnesium Chloride 0·1 Gm., Sodium Carbonate 1·2 Gm., Distilled Water sufficient quantity to 1,000 Cc. Sterilise for 30 minutes at 115° C.

Ghatti Gum is from *Anogeissus latifolia* (N.O. *Combretaceæ*)—used technically chiefly. **Mucilago** of this is *B.P.* '14. 1 to 3 of water.

Leaves of the Indian Gum, are used for tanning light leathers.—Imp. Inst. Rept. 1930.

Impurities, Acidity and other Pharmaceutical Data relative to Gum Acacia.—See Vol. II.

ACETANILIDUM.

In most Pharmacopœias.

Syn. ANTIFEBRIN, PHENYLACETAMIDE.

$CH_3CO.NH.C_6H_5 = 135·0782$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) Maximum single dose 8 grains (**0·5 Gm.**); Max. daily dose 23 grains (**1·5 Gm.**). May be given in cachets or suspended by compound tragacanth powder.

Prepared by the action of glacial acetic acid on aniline. In small white odourless glittering crystals with M. pt. 113° C., which produce a burning sensation on the tongue.

Antidotes.—Emetics, Inhalation of Ether and Oxygen, Stimulants—*e.g.*, Strychnine hypodermically, warmth to feet and body.

Soluble 1 in 210 of water, slightly in glycerin, 1 in 4·2 of alcohol 90%, easily in chloroform, benzol and ether.

Pharmacology and adverse effects.—The anilides, *e.g.*, Acetanilide and Phenacetin, owe their activity in part to the fact that they are only slowly hydrolysed in the organism with liberation of the parent base.—O. C. M. Davis, B.M.J. ii./22,11.

The action on the heart, blood and respiration is similar to that of Aniline. In Aniline poisoning, there is a relative increase in erythrocytes, hæmoglobin and oxygen capacity; with a very low blood pressure. Chronic poisoning causes anæmia. The brown colour of the blood and urine is due to the presence of *p*-amino-phenol.—Jl. Ph. & Exp. Ther., '26,125.

Prolonged administration of sublethal doses produces anæmia and emaciation.—Jl.A.M.A., ii./26,103.

'Head and Nerve Powder' containing 8 grains Acetanilide and 2 grains of Tartaric Acid caused swelling of the face and a feeling as if patient was going to burst.—B.M.J. i./31,524.

For deaths from and risks with Acetanilide; Tests for Acetanilide, also use of Acetanilide in the form of 'TUBES TEMOINS' *to determine efficient sterilisation of Dressings, see Vol. II.*

Uses.—As a febrifuge and antipyretic, hypnotic sedative, anti-epileptic, anti-arthritic, and nervine tonic. Checks the chills and fever of phthisis, quiets the nervous system, and is useful in typhoid. Relieves sciatica and the darting pains of locomotor ataxy.

Tablets, 3 grains (**0·2 Gm.**). *Dose.*—1 or 2.

Also made **with Caffeine,** 1 grain; useful in migraine.

Stipule No. 1 holds 5 grains (**0·3 Gm.**).

Pulvis Acetanilidi Compositus, U.S. VIII. (*not now in U.S.*).

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

Acetanilide 7, Caffeine 1, Sodium Bicarbonate 2.

Elixir Acetanilidi Compositum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Acetanilide 326 grains, Caffeine 32 grains, Nux Vomica Tincture 256 minims, Aromatic Spirit of Ammonia 8 ounces, Aromatic Elixir to 16 ounces. Filter with aid of Talc 120 grains. For headache.

***Phenalgin** (T.M. 221616). *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

A mixture with Antifebrin as the active base, as an antipyretic and hypnotic. **Tablets and Gelatin (Hard) Capsules,** 5 grains.

Caution.—Analysis of Phenalgin gave Acetanilide 60%, Sodium Bicarbonate 25%, Ammonium Carbonate 15%. Incompatible with Calomel and Aspirin. Dangerous interaction may occur.—J. Noble, P.J. i./22,151.

Methylacetanilide. *Syn.* ***Exalgine.** (T.M. 90208). Fr. Cx. $C_6H_5N(CH_3)CH_3CO = 149.0938$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. In colourless crystals, with a slight saline taste.

An analgesic, anti-neuralgic, antipyretic (only in unsafe doses). Toxic doses cause paralysis of respiratory organs.

Soluble 1 in 60 of water, freely in alcohol.

Incompatible with salicylic acid.

Mistura Exalgine. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**). Exalgine 1, Tincture of Orange 4, Syrup of Orange-Flower 12, Water to 100.

Tabellæ Exalgine.—½ grain (**0·03 Gm.**) each, with chocolate.

ACIDUM ACETICUM.

Acidum Aceticum Glaciale (*B.P.* '14). U.S. X. Contains 98·9% Hydrogen Acetate. $CH_3.COOH = 60·0292$. Sp. Gr. 1·058. P. Belg. IV., P. Ital. V. and F.E. VIII. not less than 96%.

A colourless liquid or crystals melting at about 14·7° C.

Uses.—Is not given internally. It is applied to corns and warts. Has caustic action, but gives much pain.

Psoriasis of a chronic type has been cured in a week or two by Glacial Acetic Acid locally.

Antidotes.—Chalk and water, alkalis, magnesia, washing soda, and then demulcents such as olive or almond oil, milk, or white of egg.

Acidum Aceticum (*B.P.* '14). 33%. U.S. X. is 36–37%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This has Sp. Gr. 1·044. P. Austr., P.G. VI. and P. Belg. IV. (30%) and F.E. VIII. (30%) designate this acid 'Dilutum.' A product of the destructive distillation of wood and of the oxidation of ethylic alcohol.

Incompatibles.—Alkalis. (Hydrates, Carbonates, etc.).

Use.—Externally for ringworm.

Acidum Aceticum Dilutum (*B.P.* '14). 5%.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Sp. Gr. 1·007. (Fr. Cx. is 10%; U.S. X. 5·7–6·3%.)

Uses.—May be given as an antidote to poisoning by alkalis, and largely diluted is applied as a lotion for inflamed joints., &c., and to bathe the skin as a refrigerant in cases of fever.

Lotio Acidi Acetici R.O.H. Dilute Acetic Acid 30 minims, Water to 1 ounce. Relieves itching and irritation, *e.g.*, in spring catarrh.

Acetum. *Syn.* Vinegar. Contains about 4% of acetic acid. Made from fermented Malt Liquor and from wine and artificially by diluting Acetic Acid and colouring with burnt sugar.

Chronic vinegar poisoning in which nearly a quart of vinegar had been taken every day for 30 years.—D. A. Urquhart, B.M.J. ii./27,1226.

Acidum Pyrolignosum Crudum. A brown acid liquid, the product of destructive distillation of wood. Contains Acetic Acid 5 to 13% (P.G. VI. has minimum 8·4%) according to the kind of wood used, also other acids—Propionic, Butyric, etc., also small quantities of Methyl Alcohol, Furfural, Pyridine, Creosote and Resins. Has been employed locally to gangrene and has veterinary uses. It has antiseptic and preservative properties.

Acidum Pyrolignosum Rectificatum. Contains about 5% Acetic Acid of yellowish color becoming darker on keeping. Occasionally ordered diluted 5 to 10% in mouth-washes and gargles.

Acetic Anhydride. $(CH_3CO)_2O = 102·0468$.

A colourless liquid with pungent odour, Sp. Gr. 1·080. B. Pt. 138° C.

Manufacture.—British Patent 137701. By interaction of Anhydrous Sodium Acetate and Carbonyl Chloride, thus:—

$2CH_3.COONa + COCl_2 = (CH_3.CO)_2O + CO_2 + NaCl$.—J.C.S.A. i./20,287.

Tests 95 to 98% pure, the rest being acetic acid. Not employed medicinally to any extent, but chemically, *e.g.*, in the process of acetylation. Should be free from Hydrochloric Acid.

Acetyl Chloride. $CH_3COCl = 78·4804$.

Manufacture.—By combining carefully Glacial Acetic Acid 130, with Phosphorus Pentachloride 137. Finally, distil and redistil the fraction passing over below 60° C.—this separates from phosphorus oxychloride. A volatile liquid with intensely penetrating odour, boiling at 51° C.

Acidum Amido-Aceticum.—*Syn.* Glycocoll, Glycine.

$CH_2.NH_2.COOH = 75·047$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) suggested.

White crystals with sweet taste, ***soluble*** in water 1 in 4½, slightly in alcohol, not in ether. M. pt. 234° C. It is both acidic, by reason of its acid group, and basic by reason of its amino grouping. It forms double salts with soluble metallic chlorides and nitrates.

The Amino Acids are diuretic—they are decomposed by the liver with formation of urea. Glycocoll used as such is non-toxic and is not unpleasant to take. Experiments on healthy individuals showed decided increase in the output of urine under daily doses of 5 Gm.; Sp. Gr. remaining the same, also increase in Chlorides excreted. In some cases good results by the use of Glycocoll with Digitalis.—P.J. ii./11,499.

The name " Glycin " (not now a T.M.), though applied in Chemistry to this body, was given (P.J. i./07,208) to *p*-oxy-phenyl-amido-acetic Acid $C_6H_4OH.NHCH_2.COOH.$=167·0782. Used in photography as a developer. For further consideration of AMINO-ACIDS *see Vol. II.*

Choline. $HO.N(CH_3)_3C_2H_4.OH$=121·125. A non-poisonous syrupy fluid (*v.* also Vol. II). A decomposition product of Lecithin.

Choline has been isolated from washed portions of rabbits', dogs' and cats' intestine. It has the power of stimulating intestinal movements. Acetylcholine is even more active in stimulating peristalsis.—Le Heux, Pfluger's Archiv. 1919, p. 8, per Pres., Oct., '20,361.

Choline Chloride. *Syn.* CHOLINE HYDROCHLORIDE.

$Cl.N(CH_3)_3C_2H_4.OH$=139·5642. *Dose.*—0·6 Gm. intravenously.

Deliquescent needles soluble in water and Alcohol.

ILEUS treated by Choline Hydrochloride. It acts on the hormone of intestinal movement. That it is specific in its action on the intestine is shown by the fact that it does not affect the rhythmicity of the heart or of the uterus. In practice it is well to make ampoules containing 0·6 Gm. of the Hydrochloride in 6 Cc. This solution is diluted with 180 Cc. of Normal Saline and given intravenously. At least 17 minutes should be employed to administer the whole of the solution. The treatment re-established normal function in some cases.—C. G. L. Wolf and J. R. C. Canney, L. i./26,707.

Sterules of Choline Chloride contain 0·6 Gm. in 6 Cc. for dilution as indicated.

Pacyl Tablets.

Dose:—1 or 2 tablets twice or thrice daily commencing with the smaller dosage—to be swallowed whole and followed with water.

A Choline preparation, each tablet containing 1/12 grain (0·005 Gm.), employed to reduce blood pressure in arteriosclerosis, chronic nephritis and the climacteric.

Sedicyl Tablets.

Dose:—1 or 2 tablets three times daily—subsequently 2 tablets a day. A Choline derivative used at the climacteric.—L. i./31,170.

Acetylcholine.

The Acetyl derivative of Choline, $(CH_3)_3N(OH).C_2H_4.COO.CH_3$= 163·1406, usually employed as **Acetylcholine Chloride** or **Hydrochloride.** *Syn.* ACÉCOLINE, $(CH_3)_3N.Cl.C_2H_4.COO.CH_3$=181·6076. A white hygroscopic powder forming a stable solution in water.

Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**) subcutaneously or intramuscularly, and $1\frac{1}{2}$ grains (**0·1 Gm.**) the following day. If inadequate after 10 days, increase to **0·2 Gm.** twice daily. Average course 15 days' treatment per month for 2 or 3 months. *Dangerous intravenously and ineffective orally.*

Ampoules contain **0·02, 0·05, 0·1** and **0·2 Gm.**

Uses.—Possesses the properties of Choline in a greater degree. Has powerful vasodilator effect, which is confined to the arteries and arterioles, and is of value in Raynaud's syndrome, gangrene arising from arteritis, and in the complications of arterial hypertension. Tuberculous sweats yield to doses of 0·01 to 0·02 Gm.

Contraindications.—Old people with atheromatous arteries —danger of giving too large a dose.—M. Villaret and L. Justin-Besançon, L. i./29,493, Pres. Apl. '29,146.

Acetylcholine resembles Histamine in features. It was made by Nothnagel in 1894. It was found in Ergot extracts by Dale and Ewins, and in 1929 by Dale and Dudley as a normal constituent in ox and horse spleen.—H. H. Dale, L. i./29,1287.

M.R.C. Annual Report, 1928-29. Identification of Acetylcholine in the spleen of large animals.—B.M.J. i./30,559.

HYPERPIESIS without marked arterial change treated. Semi-permanent fall in blood pressure produced.—A. H. Douthwaite, B.M.J. i./30,742.

Twenty years after physiological activity was known the drug came into clinical use. Clinicians might pay more attention to physiology. It produces dramatic relief in various forms of arterial spasm. Of benefit in early arthritis deformans, hemiplegia, trophic ulcers, hyperidrosis and other conditions, *e.g.*, lead colic. Unstable in aqueous solution and oxidation produces toxic substances—should be kept in powder form in sealed ampoules. *Dose.*—1 to 6 grains. Has no cumulative action and may be given for months without ill effects. A valuable and interesting remedy for which other clinical uses will probably be discovered in time.—Editorial B.M.J. ii./30,1011.

Neurine. Trimethyl-Vinyl-Ammonium Hydroxide.

$N.(CH_3)_3(C_2H_3)OH = 103{\cdot}1094.$

A ptomaine resulting as a decomposition product of meat. Highly poisonous. Hygroscopic. Commercially a 25% solution is prepared. 3 to 6% aqueous solution has been used to paint diphtheritic membrane.

Betaina. *Syn.* TRIMETHYL-GLYCOCOLL. $C_5H_{11}NO_2 = 117.0788.$

Betaine occurs in *beets and mangolds* (especially *un*ripe roots) and has been found in a number of vegetable and animal substances.

It is formed on oxidation of Choline and is chemically related to Muscarine and Neurine.

Betainæ Hydrochloridum.—*Syn.* ✱ACIDOL. (T.M. 263431.)
$C_5H_{11}NO_2.HCl = 153{\cdot}5586.$

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**).

Manufacture.—Patented method from Molasses. *See* Edn. XIX., p. 5.

White crystalline substance soluble in water 1 in 2; in alcohol about 1 in 20.

Uses.—Liberates hydrochloric acid (almost 25% of its weight), and is given with pepsin or diluted with water in gastric affections.

Flavoring.—Glyl Rosæ, Glyl Menthæ Piperitæ, Syl Caryophylli, Syrupus Aurantii.

Acidol-Pepsin.

Dose.—1 or 2 tablets (7½ grains in each) in water after meals.

Contain Betaine Hydrochloride and Pepsin. Issued in two strengths, No. 1 strongly acid, No. 2 slightly acid, equivalent to 10 and 1½ minims respectively of Dilute Hydrochloric Acid.

In anorexia, hypochlorhydria, gastritis, etc.

Acetamide. $CH_3.CO.NH_2 = 59{\cdot}047.$

Deliquescent crystals M.pt. 82° C., made by interaction of Ammonia and Acetyl Chloride. As a denaturant (½%) of Alcohol has been used, *e.g.*, in Phenacetin manufacture.

Acetamide or Formamide, either molten or in solution, used in extracting drugs.—F. Bayer & Co.'s Patent.—P.J. ii./22,295.

ACIDUM BENZOICUM.

In numerous National Pharmacopœias

Syn. BENZOYL HYDRATE. $C_6H_5.COOH = 122{\cdot}0468.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured either from Gum Benzoin or from Toluol, the former being the more expensive.

Soluble, if pure, 1 in 400 of water; 1 in 3 of alcohol 90%; 1 in 7 of chloroform; and very soluble in fats, oils, and in glycerin about 1 in 30.

Incompatible with Ferric Salts and Mercuric Chloride.

Uses.—Benzoic acid is an antiseptic, a stimulating expectorant, antipyretic and diuretic. It is given in cases of chronic cystitis, urinary calculi and incontinence, also for rheumatism. It acidifies the urine but is mostly employed in form of one of its salts—*v. postea*. It prevents fats becoming rancid, as in Adeps Benzoatus, *q.v.*

Four grains of Benzoic Acid with 1 grain of Canada Balsam, or 1 minim of glycerin, make a good pill.

A one in 20 solution in alcohol relieves urticaria, and, as an **Antiseptic Lotion** or **Gargle**, 1 dissolved in 500 of water is employed.

15 to 20 grains every hour or 2 hours has specific remedial action in acute rheumatism, but is much weaker than Sodium Salicylate. —R. Stockman, B.M.J. i./13,597.

For use as preservative in Foods, etc., see Vol. II.

Ⓟ **Tablets, Benzoic Acid Compound.**

Dose.—One or two occasionally.

Benzoic Acid ½ grain, Codeine 1/10 grain, Ipecacuanha Root 1/10 grain, Menthol 1/10 grain, Red Gum ½ grain. Stimulating and soothing for throat irritation.

Benzoin.—There are two varieties known as Siam and Sumatra, the former being the better. U.S. X. allows both. Sumatra Benzoin is *B.P.* '14 if at least 85% soluble in alcohol 90%. *For source of Siam Benzoin, see Vol. II.*

Tinctura Benzoini Composita (*B.P.* '14). *Syn.* Friars' Balsam, Traumatic Balsam.

Dose.—½ to 1 drachm (2 to 4 Cc.), with yolk of egg. U.S. X. has approximately the same composition as *B.P.* '14.

A drachm to a pint of hot water is valuable as an inhalation in acute laryngitis. Undiluted it is used as a wound dressing.

Tinctura Benzoini Simplex.

Dose.—½ to 1 drachm (2 to 4 Cc.).

One in 10 of Alcohol (90%) (U.S. X. is 1 in 5). P. Ital. V. 1 in 5 of Alcohol (80%). One of the Tincture in Rose Water 40, is useful as a face lotion in urticaria and in irritable conditions of the skin.

Mistura Balsami Composita—Vic. Park. *Dose.*—1 ounce (30 Cc.).

Compound Tincture of Benzoin, Tincture of Tolu and Compound Tincture of Camphor, of each 20 minims, Ammoniacum Mixture to 1 ounce.

Sphygmographic Varnish. Contains Benzoin, Balsam of Tolu and Alcohol. This is used for pulse tracings.

Collutorium Acidi Benzoici, R.D.H.

Dose.—One tablespoonful in a tumblerful of water.

Benzoic Acid 10 grains, Krameria Tincture 15 minims, Gluside 6 grains, Peppermint Oil 2 minims, Cinnamon Oil 2 minims, Alcohol 90% to 1 ounce.

Miller's Mouth Wash is similar.

Trochisci Acidi Benzoici.

Contain ½ grain with either simple sugar or fruit basis (*B.P.* '14): those of T.H. have a red currant basis. Useful as a voice lozenge.

Ammonii Benzoas (*B.P.* '14). $C_6H_5.COONH_4=139{\cdot}0782$.

Dose.—5 to 15 grains (0·3 to 1 Gm.)

In colourless laminar crystals: ***soluble*** 1 in 6 of cold water, 1 in 30 of alcohol, and 1 in 8 of glycerin.

Flavoring.—Glyl Sassafras, Glyl Aurantii Amari: Syrupus Aurantii, Syrupus Tolutanus.

Useful expectorant in chronic bronchitis.

Where pyelitis is associated with cystitis the urine is frequently alkaline, ammoniacal and offensive, Ammonium Benzoate or Salicylic Acid, may be of value on account of their action within the bladder.—Tirard.

Mistura Boro-Benzoatis, K.C.H.

Dose.—1 ounce (**30 Cc.**).

Ammonium Benzoate 20 grains, Boric Acid 10 grains, Tincture of Hyoscyamus 30 minims, Infusion of Buchu to 1 ounce.

A useful urinary antiseptic mixture.

TRAUMATIC PARAPLEGIA. Bladder and rectal functions show a departure from normal and often complete paralysis of micturition. Ammonium Benzoate over long periods does not cause digestive upsets like Sodium Acid Phosphate. A routine mixture:—Ammonium Benzoate 15 grains, Urotropine 10 grains, Hyoscyamus Tincture 30 minims, Syrup of Orange 1 drachm, water to 1 ounce. The urine can generally be kept at a constant level of acidity by this and drainage. Irrigation with 1 in 8,000 Potassium Permanganate, in some cases.—O. H. Gotch, B.M.J. i./23,849.

Magnesii Benzoas. $(C_6H_5.COO)_2Mg = 266{\cdot}398$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White crystalline powder. Antipyretic. ***Soluble*** in water 1 in 30, hardly soluble in alcohol 90%. ***Incompatible*** with Acids, also with Sodium Bicarbonate.

Used as an anti-arthritic for rheumatism and cathartic in cirrhosis of the liver.

Sodii Benzoas (*B.P.* '14); FR. CX. Sup. 1920, P. Ital. V.

$C_6H_5.COONa = 144{\cdot}039$. Ph. Ned. V. has $\frac{1}{3}$ mol. H_2O.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In white granular crystals: ***soluble*** 1 in 2 of cold water.

Two varieties are made, one from the acid obtained from Gum Benzoin, the other from the artificial acid—the cheaper of the two.

Flavoring.—Syl Vanillæ, Glyl Carui, Syrupus Aromaticus.

Incompatible with mineral acids and with Ferric Chloride. It is apt to cause gastric irritation if taken on an empty stomach.

Uses.—Urinary antiseptic. Acute lacunar tonsillitis is stated to be curable with it in 12 to 36 hours if given in 5 to 15 grain doses every 2 hours. In pyelitis due to *B. Coli* infection, Sodium Benzoate combined with Hexamine has given good results.

Tablets 2 grains each.

***Cryogenin** (T.M. 248320). — *Syn.* META-BENZAMINE-SEMICARBAZIDE. PHENYL-SEMICARBAZIDE. F.E. VIII.

$C_6H_4.CONH_2.NH.NH.CONH_2 = 194{\cdot}058$.

Dose.—3 to 24 grains (**0·2 to 1·5 Gm.**).

A crystalline body only slightly soluble in water and 1 in 25 of alcohol 90%.

A useful antipyretic in acute fevers. A case of erysipelas migrans successfully treated. Dose 10 to 15 grains per diem during 7 days, also in treatment of phthisis and lingering pyrexia following acute stages of an infection.—H. Sainsbury, L. ii./15,336. In chest affections 5 to 7 grain doses at 3 p.m. to anticipate the evening rise in temperature. If single dose not sufficient give 5 grains thrice daily in the 12 hours.—A. T. Davies, *ibid.* 835.

Acidum Hippuricum. *Syn.* BENZAMIDO-ACETIC ACID, BENZOYL GLYCOCOLL. $COOH.CH_2.NH.CO.C_6H_5 = 179{\cdot}0782$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

This acid, occurring as white crystals, ***soluble*** in hot water (very slightly in cold—about 1 in 600), melting at 187° C., may be prepared from the urine of herbivora, also synthetically by treating Glycocoll (Amino-acetic Acid, $CH_2NH_2.COOH$, *q.v.*) with Benzoyl Chloride or Benzoic Anhydride.

Hippuric Acid Synthesis Test as regards functional condition of the kidney. The normal amount of Hippuric Acid having been estimated, the patient is given 0·5 Gm. each of Glycocoll and Benzoic Acid. Analysis of 24 hours' urine should then show an excess over normal of about 0·74 Gm., the normal being 0·4 Gm. When the figure is lower the hippuric function is abnormal and probably there is some renal parenchymatous disorder.—P. L. Violle, L. i./21,1239.

Sodii Hippuras. $C_9H_8NaNO_3=201·0674$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A soluble white powder used in gout, gravel, and calculus, as solvent for urates. A powerful depressant in arteriosclerosis.

Ammonium Hippurate and **Calcium Hippurate** are salts with properties allied to the Sodium compound.

Acidum Phthalicum. $C_6H_4.(COOH)_2=166·0468$.

Dose.—20 grains 4 hourly. Has slight anti-rheumatic effect.

Benzoyl Peroxide, $C_6H_5.CO.O_2.CO.C_6H_5=242·078$. A crystalline compound, M. Pt. 103·5°, prepared by the interaction of 100 of sodium peroxide and 180 of benzoyl chloride, at a low temperature. Soluble slightly in water, more so in alcohol.

Uses.—For burns and ulcers 2 to 3% solution in oil.

ACIDUM BORICUM.

Syn. Boracic Acid (*B.P.* '14), Hydrogen Borate. Sal Sedativa de Homberg, F.E. VIII., P. Belg. IV., P Ital. V.

$H_3BO_3=61·8434$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white laminar crystals, or as powder (that known as **Pulv. Acid. Boric. Subtilis** has been passed through a No. 170 sieve); with bitterish taste, made by the action of sulphuric acid on borax and other borates.

Soluble 1 in about 25 of water, 1 in 3 of boiling water, 1 in 30 of 90% alcohol, 1 in 5 of glycerin at 0° C., 7 in 10 at 100° C., slightly soluble in volatile oils. Insoluble in ether.

Prescribing Note.—May be given in slipule form.

Incompatible with sodium salicylate in powder—a borosalicylate is apparently formed.

Uses.—Antiseptic and antiputrefactive. In powder and crystals as dressing to wounds, sores, and skin generally. Boric Gauze contains 10 to 15%, Boric Lint 35 to 45% and Boric Wool 15 to 25%. When mixed with starch it forms a useful "dusting powder" for infants, &c. A little in the socks or stockings prevents the odour of perspiring feet.

As **Eupad** and **Eusol** *q.v.* it was much used as a wound dressing.

Vomiting in gastric dilatation or gastric catarrh of infants has been treated by washing out the stomach with weak Boric Acid Lotion.

Cachets of Boric Acid containing 10 grains (**0·6 Gm.**), as antiseptic before and after bladder operations, have been given in typhoid, also for cystitis. **Tablets** contain 5 grains.

In otorrhœa an alcoholic solution of boric acid may be used.

Fifty per cent. of the acid administered, it has been found, is excreted in the urine within 12 hours, the rest remains in the body for 3 or 4 days and hence may accumulate under repeated dosage.

B. Coli grew with difficulty in sterilised urine after taking Boric Acid *per os*. It is efficient as a urinary antiseptic, its action being apparently unaffected by alkalinity.—A. Jordan, B.M.J. ii./13.653.

RODENT ULCER. A Boric Lotion and Adrenalin Solution applied had remarkable effect. In three weeks the ulcer healed.

Boric Acid Poisoning. A teaspoonful taken in error has caused death.

Used for lavage, by idiosyncrasy it may prove poisonous.—Rash produced. Empty the stomach or give an emetic of mustard or Magnesium Sulphate.

Fatal poisoning of six babies weighing about 7 lbs. with from 0·8 to 3 Gm. of Boric Acid given in solution in error for water.—P.J. i./27,361.

In December, 1928, the writer took about 1 drachm of Boric Acid in solution from a measure on the laboratory table in error, thinking it to be water (about 2 to 3 ounces of 1 in 30 solution). The taste was poor in consequence of 'liverishness,' hence the difference between the solution and plain water would not be noticed. As emetic ½ ounce of Vin. Ipecac. with an ounce or so of water was taken with no effect. About 5 ounces of saturated salt solution were then taken, also without effect. Finally, by means of the fingers a small amount of acid mucus was got away. There was great thirst at night.

For its use as a **milk, cream, etc., preservative**—*vide Vol. II.*

Glycerinum Acidi Borici (*B.P.* '14). **Glyceritum Boroglycerini.**

Heat Glycerin 9 (by weight) to not above 150° C., and add Boric Acid 6. Continue heat with stirring until weight is reduced to 10, and add Glycerin (by weight) 10. **U.S.X.** has 31 in 100.

It is readily miscible with water and alcohol. Of value in otorrhœa.

Guttæ Pro Auribus Acidi Borici. N.H.I.

Boric Acid Powder 35 grains, Industrial Spirit 76 minims, Glycerin to 1 ounce.

Pessus Glycerini Acidi Borici for vaginal use weigh 90 grains each, and contain 70 grains of Glycerin of Boric Acid with gelatin 10 grains and water 10 minims.

Acidum Boro-Salicylicum.

Boric Acid 3, Salicylic Acid 1. A white powder, ***soluble*** about 1 in 120 of water. Is mostly employed as—

Sodium Boro-Salicylate.

Dose.—5 to 45 grains (**0·3 to 3·0 Gm.**).

Has been given in rheumatic affections.

Liquor Antisepticus, U.S. VIII.

Average dose.—1 drachm (**4 Cc.**).

Boric Acid 20, Benzoic Acid 1, Thymol 1, Eucalyptol 0·25, Oil of Peppermint 0·5, Oil of Gaultheria 0·25, Oil of Thyme 0·1, Alcohol 250 and Water to 1,000. Filtered through talc. Resembles ***Listerine Antiseptic.** (Listerine is T.M. 463,839 Class 2, 27665, and 469574 Class 3, 259141 and 294469 Class 48.)

Listerine Antiseptic examined by method of G. F. Reddish on *S. aureus*, *S. hæmolyticus* and *viridans*, *pneumococcus* and *B. acidophilus odontolycus*.

Killing time for majority of organisms was 20 seconds. Approximately 600 to 800 millions of the various organisms killed in 15 seconds at 37° C.—L. ii./29,616.

Lotio Acidi Borici, R.O.H. 16 grains to 1 ounce (4% approx.).

A useful soothing antiseptic lotion for the eyes, bladder, vagina and mouth.

Isotonic Boric Acid Lotion is 2% strength—isotonic with the tears.

Lotio Acidi Borici cum Zinci Sulphate, R.O.H.

Boric Acid 8 grains, Zinc Sulphate ½, 1 or 2 grains, Water to 1 ounce.

A.B.C. Powder.

Boric Acid, Bismuth Subnitrate, Calomel, equal parts. A stimulant antiseptic dusting powder.

Pastillus Acidi Borici, T.H., *v.* Glyco-gelatin Pastils.

Useful in aphthous affections of the mouth and throat.

Pessus Acidi Borici.

Ten grains (**0·6 Gm.**) in each, with Theobroma Oil.

Convenient to replace douches after delivery.

Suppositorium Acidi Borici.

Three grains (**0·2 Gm.**) in each. Useful in pruritus.

Unguentum Acidi Borici—*Martindale.*

	No. 1.	No. 2.	No. 3.
Paraffin (M.Pt. 57° C.) ..	.. 5	.. 5	.. 5
White Soft Paraffin ..	.. 5	.. 10	.. 15
Boric Acid, in fine powder..	.. 2	.. 3	.. 4

Melt the paraffins, sift the Boric Acid into the liquid, and stir constantly till cold. These three ointments contain the same quantity of Boric Acid, *i.e.*, 1 to 5 of basis.

'No. 1' is used where cavities exist or where a stiff base is needed. 'No. 2' is for use to surface wounds, burns, eczema, chaps, pruritus ani et pudendi, and sores, as an antiseptic dressing and 'healing ointment.' 'No. 3' is for toilet use. '**Boric Cream**' is similar.

The *B.P.* '14 Ointment is far too stiff for general use. A small proportion of Beeswax, *e.g.*, 3%, improves it, as pointed out by J. H. Franklin.

'**Collapsubes,**' *i.e.*, collapsible tubes containing ointments, creams and lubricants, with catheter attachment for applying to the urethra, and with suitable tubes for the uterus and rectum. For general purposes 'Collapsubes' alone are provided. *See* Index for list.

'Collapsubes' are also suitable for introducing ointments into the nose. The patient should put the head well back and press the ointment into the nostrils.

Small size Collapsubes marked * in Index are convenient in ophthalmic surgery.

Unguentum Acidi Pheno-Borici.

Contains 2½% of Phenol added to either No. 1, No. 2 or No. 3 Boric Acid Ointment. In some cases this may prove more healing.

Unguentum Lano-Boricum Camphoratum.

Boric Acid Ointment (No. 2) ½ ounce, Hydrous Lanolin, ½ ounce, Essential Oil of Camphor 20 minims.

For earache in children. Applied with a brush to the meatus.

Petrolatum Acidi Borici.—*Syn.* Boric Petroleum Jelly.

Boric Acid in fine powder 1, White Soft Paraffin 9.

In Collapsubes with catheter attachment for urethral use or with tube suitable for uterine or rectal use.

Unguentum Demulcens R.N.H.

Boric Acid 5 grains, Glycerin of Starch, Hydrous Wool Fat, and Soft Paraffin of each equal parts, to 1 ounce.

Magnesii Boro-Citras.

Dose.—15 to 30 grains (**1 to 2 Gm.**).

Manufacture.—Dissolve Light Magnesium Carbonate 70 in a solution of Citric Acid 100 in Water 400, add Boric Acid 30, evaporate to dryness on a water bath and powder or scale.

A white powder or colourless scales, readily soluble in water; used as a urinary antiseptic internally for stone, gout, and rheumatism : and 1 with 2 of sugar is prescribed as **Boracite,** or **Pulvis Magnesii-Boro-Citratis Composita.** *Dose.*—60 grains *ter die,* to sterilise the urine 48 hours before operations.

Undergoes some dissociation in the body, with hæmostatic effect, but inferior to the lactate *q.v.*

Sodii Biboras. Borax. *B.P.* '14, **Sodii Boras** (U.S. X.). *Syn.* Sodium Pyroborate, Sodium Tetraborate. $Na_2B_4O_7.10H_2O=381{\cdot}43$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Soluble 1 in 25 water, in glycerin 1 in 1, insoluble in alcohol (90%). ***Incompatible*** with gums, mineral acids, also with cocaine hydrochloride.

Flavoring.—Glyl Pini, Syl Lavandulæ, Syl Rosæ ; Syrupus Aromaticus.

Uses.—As gargle in diphtheria, for aphthæ, cancrum oris, and gangrenous stomatitis ; pruritus ani and vulvæ, in bromidrosis and fœtid sweating of the feet.

Gouty affections are treated with compresses of saturated solution.

Epilepsy.—In chronic cases, as an adjuvant to or substitute for Bromide. It lessens excitability—J. McCartney, B.M.J. ii./20,548 ; ii./21,527,617,673, and with Fowler's Solution.—B.M.J. i./23,16. *See also Potassium Borotartrate.*

Considered better than Luminal. Treatment consists essentially of Borax 10 grains and Sodium Bromide 10—15 grains thrice daily. If the fits do not cease in a fortnight, the Borax is increased to 15 grains. After 6 weeks 15 minims of Belladonna Tincture daily are given in addition if necessary, and after 2 months it is reduced and then omitted. The salt mixture is given for a year at least, when the Bromide is gradually reduced. The patient then remains on Biborate for another year. This almost invariably achieves a cessation of fits in adults, but children do not as a rule respond so well.—P. Figdor, L. ii./25,840. See also *ibid.* 892,943.

Fatal Poisoning in 2-weeks' old child following ingestion of 1½ drachms Borax and Boric Acid in the form of Honey and Borax and Glycerin of Borax : a dummy teat dipped in the latter may convey 1½ to 2 grains of Borax to the child's mouth.—J. Birch, B.M.J. i./28,177 ; L. i./28,287.

Hyperthyroidism.—A daily dose of 2 to 4 Cc. of a 5% solution of Sodium Borate taken with meals gave good results.—Jl. A.M.A. ii./25,308.

Potassii Biboras. *Syn.* **Potassium Pyroborate.**

$K_2B_4O_7.5H_2O=323{\cdot}558$.

Prismatic crystals, readily soluble in water.

Varicose and traumatic ulcers treated with tri-weekly application consisting of Boric Acid 63 Gm., Potassium Hydroxide 28 Gm., Water 200 Cc., starting with half-strength solution.—Per Jl. Trop.

Med., June 1, '26,165. The quantities employed are the calculated amounts to produce Potassium Biborate. The solution contains approx. 58 Gm.

Sodii Boro-Tartras. *Syn.* TARTARUS BORAXATUS.

Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

Sodium Biborate 2, Potassium Acid Tartrate 5, Water 15, evaporate until a little of the residue cooled is brittle. Powder and dry at 50° C. Antiseptic and diuretic. May be tried for gout.

See also Potassium Borotartrate, re Epilepsy.

Sodii Perboras. FR. Cx. Supp. II., F.E. VIII. [$NaBO_3,4H_2O$= 153·8794; derived from the hypothetical Perboric Acid, HBO_3= 59·8278. A white permanent powder. ***Soluble*** in water, about 1 in 50, with decomposition.

Manufacture.—Sodium Perborate may be prepared pure by treating Crystalline Borax 380 Gm. with Normal Sodium Hydrate Solution 2,000 Cc. to convert it into Sodium Metaborate—$NaBO_2$, and then adding to the solution 4,500 Cc. of 10 Volume Hydrogen Peroxide Solution. Cool immediately by refrigeration and collect and dry the crystalline precipitate on filter paper.

For details of Assay, see Vol. II.

Uses.—Antiseptic and deodorising.

To produce **Oxygenated Water,** 1 kilo yields 104 Gm. or about 72 litres of active oxygen. This quantity will produce 7 to 7·5 litres of '10 volume' oxygenated water. The solution is not acid. It contains Hydrogen Peroxide and Borax. In practice 170 Gm. with 60 Gm. Citric Acid makes a litre of about '10 volume' strength.

These solutions may be used to prepare antiseptic lotions, vaginal injections (about '5 volume' strength), *e.g.*, in leucorrhœa and metritis, and are useful in minor surgery. The dry salt may be used as a disinfectant, deodorant dusting powder.

It has been used for soil-contaminated wounds.

Tonsillitis occurring as complication in typhoid has been treated with Sodium Perborate gargle, 2 drachms to the pint.

VINCENT'S ANGINA. Rapid cure in 95% of cases with 2% Sodium Perborate solution as a mouth wash. Best used as a thick paste and retained in the mouth for 4 or 5 minutes while oxidising froth develops.—Jl.A.M.A. ii./28,247.

Unguentum Sodii Perboratis. 1% in Paraffin Ointment basis. Antiseptic and healing.

Sodium Perborate Tooth Powder. Sodium Perborate 2%, in Precipitated Calcium Carbonate.

✱**Zoel** (T.M. 373442) **Antiseptic** contains Sodium Monoborate (Metaborate, $NaBO_2$). Antiseptic and deodorant. A white granular substance soluble in water 1 in 18. It is alkaline in reaction and on this account permits a free flow of lymph without coagulating.—L. ii./16.832.

✱**Persil.** (T.M. 302781, Class 2, 294552 & 513485, Class 47). A preparation extensively used in laundry work. Contains Sodium Perborate. It liberates Oxygen in contact with water.

ACIDUM CARBOLICUM.

℗*Carbolic Acid and liquid preparations of Carbolic Acid and its homologues, containing more than 3% of these substances, except preparations for use as sheep wash or for any other purpose in connection with agriculture or horticulture, contained in a closed vessel distinctly labelled with the word 'Poisonous,' the name and address of the seller and a notice of the purpose for which the preparations are intended.*

For further details regarding the sale by retail by registered and unregistered persons of liquid preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes *or* Carbolic Disinfectant *containing not more than 3% of Phenols, see 'Poisonous Substances.'*

℗*Phenol* (*B.P.* '14). *Syn.*—Phenyl Hydrate, Benzophenol, P. Belg. IV. $C_6H_5OH=94{\cdot}0468$.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Fr. Cx.; Max. single dose, 1½ grains; max. during 24 hours, 4½ grains approximately. Fenol, F.E. VIII., the same.

In colourless crystals or agglomerated masses liable to become pink—a little Sulphurous Acid will prevent this for a long time. Neutral to test paper; made by distillation of coal tar. M. Pt. 39 to 40° C. (Fr. Cx. Supp. 1920, 41° C.).

'Synthetic' Phenol made from Benzene. In Germany and U.S.A. there is not enough natural Phenol to supply demand, large quantities being needed for making **synthetic resins** and for dye intermediates and Salicylic Acid. Method described.—W. G. Adam, P.J. i./31,460.

***Antidotes* (*See also Acid. Cresylic*).**—Give **Sodium Sulphate** or **Magnesium Sulphate** 1 or 2 ounces in ½ pint of water. (They do not act chemically *but hinder absorption.*) Wash out the stomach with water several times. Apomorphine as emetic (not always effectual). White of egg, and large doses of any innocuous oil. Calcium saccharate and Caffeine are also antidotes. The former may be freely administered. Amyl Nitrite Sterules, hot water bottles. Camphorated Oil (2 drachms) has been used with recovery.

Iodine is a true antidote. Use within obvious limits the same quantity of Tincture of Iodine as of Liquid Carbolic Acid.

Liquid Paraffin has been suggested—also for burns—washing in it and dressings. Subsequently alkalis. Caffeine the best respiratory stimulant.—O. S. Gibbs, B.M.J. i./31,581.

Internally. It is thought however to be a waste of precious time.

Externally. Mop persistently with warm *Castor Oil.* If not available use plenty of soap and a little warm water, applying Castor Oil dressings later. If poison is swallowed *wash-out tube with plain water,* unless strongly contra-indicated. *Give Magnesium Sulphate and Sodium Sulphate together, whether the poison is external or internal.*—W. A. Bowdler, B.M.J. i./31,686.

Castor Oil has higher partition coefficient than Paraffin for the Acid.—O. S. Gibbs, B.M.J. i./31,770.

Alcohol lavage is no good; it promotes absorption. The same applies to plain water and glycerin.

Intravenous Saline with addition of Sodium Bicarbonate saved life in a case of inhalation of fumes.

For bad effects of compresses, local use, and inhalation, see Vol. II.

Solubility.—100 parts are liquefied by 10 of water, should form a clear liquid with 30 to 40 of water, and should be completely dissolved by 1,200 of water. Also soluble 3½ in 1 glycerin, 3 in 1 chloroform (nearly), 1 in 2 olive oil, 5 in 1 ether, 6 in 1 alcohol (90%), 2¼ in 1 benzol and 1 in about 20 soft paraffin.

Solubility in Liquid Paraffin. 1% is a saturated solution. More will dissolve warm but throws out again on cooling. It has been thought that the addition of Menthol might form a non-escharotic compound and hence alleviate effect of the Phenol but this is erro-

neous. A case turned on the subject some years ago in which a large proportion of Phenol (plus Menthol) had been prescribed as ear drops.

Incompatibility.—A solution of Lead Subacetate gives a precipitate with Phenol, but no change with the Acetate. Other Phenols, Cresols, etc., do likewise, except Pyrogallol. The precipitate may be prevented by adding a trace of Acetic Acid to the Subacetate solution.—G. A. Medley, P.J. ii./26,149.

The precipitate formed is apparently of the formula $Pb(O.C_6H_5)_2.Pb(OH)(O_2C.CH_3)$.—E. A. Lum, P.J. i./29,149,251; J. E. Driver, *ibid.* 251; *see also* E. Matthews, 297, and E. H. Lane, 321.

Flavoring.—Glyl Coriandri, Syl Vanillæ; Tinctura Lavandulæ Composita, Tinctura Cinnamomi.

Uses.—A powerful antiseptic, anti-putrefactive, caustic, and applied locally, anæsthetic. Internally for dyspepsia and flatulence, *e.g.* with rhubarb and nux vomica extract in capsule. Also for erysipelas, in typhoid fever and diarrhœa in pills coated to render them soluble in the intestines, and in puerperal fever, phthisis, bronchitis, pertussis, and for the gangrenous stage of pneumonia.

As a vaginal injection one in 80 or more of water for leucorrhœa, uterine ulceration, erysipelas, and cancer; cleanses, heals, disinfects and allays pain, and is suitable as a gargle.

Mosquitoes are kept away by 1% solution. It also relieves bites of same. 2% is effective for disinfecting instruments, the skin, and for artificial dentures left in soak all night.

ACUTE CORYZA. A 1% spray is useful.

ANTHRAX.—1 to 2 Cc. of 5% Carbolic Acid beneath and round the pustule effects complete and dramatic cure. Cheap and painless and all except severe cases treated as out-patients.—G. C. Dorling (China), B.M.J. i./32,123.

NON-SUPPURATIVE MIDDLE EAR DISEASE.—A 10% solution, with cocaine added, relieved.

SMALL-POX pustules have been touched with liquid acid with good results.

TETANUS treated by intrathecal injections. Phenol kills tetanus toxin in vitro. 1 in 400 solution employed—30 to 40 Cc. for adults. 10 out of 14 cases recovered.—S. Suvansa, L. i./31,1075. *See also* **Tetanus.**

LARYNGEAL TUBERCULOSIS.—Amputation of the diseased portion of the epiglottis, and under cocaine, pure carbolic acid was applied (four times at intervals of a fortnight) to the ulcerated area, no sign of infiltration or ulceration in the larynx.—P. R. S. M. Laryng. Section, 1911,43.

SAPRÆMIA treated by swabbing out the uterus with a mixture of equal parts of Carbolic Acid and Camphor.—L. ii./09,339.

APPENDICAL ABSCESS treated by swabbing out cavity with pure Liquefied Phenol (after removing appendix if reasonably possible). Subsequently spreading Iodoform (any amount up to ½ teaspoonful) in same, after drying out.—B.M.J. i./11,676.

WAR WOUNDS.—When used pure, cauterizes the surface and is only feebly antiseptic as its combination with albumin drains back all discharges. Solutions 1 in 60 on double cyanide gauze good "in a rush." Painless, but a weak destroyer of putrefactive organisms. Gauze must not be wrung out with the bare hand.—Casualty Station experience.—A. Don, B.M.J. i./16,648.

Hæmorrhoids treated by interstitial injection of Carbolic Acid in Almond Oil, *see* ***Carbolised Almond Oil,*** also in Liquid Extract of Hamamelis.—*See Hamamelis.*

℗**Phenol Solubes,** 5 and 20 grains, produce antiseptic lotions.

Potassium Carbolate, in proportion of 1 molecule added to 3 of Phenol assists solubility of Tablets of this kind.

℗**Acidum Carbolicum Liquefactum** (*B.P.* '14).

Dose.—**1 to 3 minims (0·06 to 0·2 Cc.).**

Fifteen parts of water by weight added to 100 of above, *i.e.*, 87% nearly. Sp. Gr. 1·067 to 1·069. This is used as a caustic.

Trouble frequently arises with liquefied phenol crystallising in the winter, when there is a sudden drop in the temperature. Experiments which we conducted showed that the proportions 8-1, 9-1, 10-1, are all apt to separate.

P. Belg. IV. has Phenol 10, Water 1.

℗**Carbolic Acid, Camphorated.**

Phenol 12, Camphor 4, Water 1.

Melt or rub together till liquefied. Is not miscible with water or glycerin. Antiseptic, and local anæsthetic, serviceable in toothache.

Ulcers produced by 'X' ray burns have been treated locally by a mixture of equal parts of Carbolic Acid Crystals and Camphor.

Caution.—*Neither of these is intended for extensive use. They are not suited for applying all over the face! Accidents have occurred.*

ACNE.—In bad cases press out the comedones, puncture pustules, evacuute contents, and apply to each the smallest quantity of a mixture of carbolic acid crystals and camphor in equal parts or in proportion of 3 to 2. Subsequent usual sulphur applications.

WAR WOUNDS of all kinds, many of them 'large,' treated by application of equal parts Phenol and Camphor—highly spoken of.—I. Feldman and A. J. Walton, L. ii./16,1043.

'Phenolisation' of gas gangrene wounds with Phenol 9 and Alcohol 1, was employed in the war, with Mencière's Solution after.

HYPOPYON ULCERS treated by a mixture of Phenol and Camphor applied with a match.—Bishop Harman, B.M.J. ii./21,737.

℗**Carbolic Acid Lotion.** *Syn.* PHENOL LOTION.

Liquefied Phenol 1, Water 19 or more as required.

Carboluric ochronosis due to use of 5% Carbolic Acid lotion as dressing to leg ulcers over 35 years.—J. L. Berry, L. ii./31,124.

Liquor Flavus, L.H.—Naphthol Yellow 'S,' 12½ grains, water 10 ounces. Used for tinting Carbolic Acid Lotion, using 96 minims to the gallon.

Lotio Acidi Carbolici, R.O.H.

Liquefied Phenol 24 or 48 minims, Water at 50° C. 1 ounce.

Solutio Phenolis, F.I., or Aqua Phenolata, to contain 2% of Phenol. Aqua Carbolisata P. Jap. is this strength.

℞ ℙ**Lotio Acidi Carbolici et Cocainæ.**

Carbolic Acid ½ drachm, Cocaine Hydrochloride ½ drachm, Cherry Laurel Water 1 ounce, Rose Water 3 ounces. For pruritus.

In the later stage of treatment of chronic eczema a Lotion containing Phenol, Liquor Picis Carbonis, Glycerin and Spirit may be used as a stimulant to growth of healthier epidermis.

℗**Carbolised Almond Oil.**

Carbolic Acid 1, Sterile Almond Oil to 20.

Hæmorrhoids.

Well treated by injection of 1 to 2 Cc. for each pile, under the mucous membrane, and injections continued at 5 to 7-day intervals until piles are of parchment-like hardness. Requires special instruments, skill, and experience.—A. S. Morley, L. i./28,545: see also W. B. Gabriel, L. i./30,162.

℗**Sterules of Carbolised Almond Oil,** 1 Cc. 5%, are made.

V. Meisen now adopts 5% Phenol in Almond Oil.—L. i./31,877.

W. S. Perrin uses Carbolic Acid 1, Glycerin 2, and Water 2—usually a 5 minim dose.—L. i./29,569. W. B. Gabriel uses 5% Phenol in Almond Oil—with usually 3 Cc. dose—as also E. T. C. Milligan; Sir Charles Gordon Watson uses. 15% Carbolic Acid in Glycerin, and A. S. Morley 5% in Oil.—B.M.J. i./31,897.

10% Phenol in Glycerin and Water is too weak. 20% better. 5% in oil, by submucous injection eliminates secondary hæmorrhage, sloughing, and pain. —A. S. Morley, L. i./29,265.

'50% P-O.'

Melted Crystalline Phenol 1 ounce, warm Almond Oil 1 ounce, and Menthol 40 grains. This is the *stock* solution. The *working* solution (5% P-O.) is 1 part of the 50% P-O. with 9 parts warm Almond Oil. 3 to 5 Cc. of this injected high up above the piles produces sclerosis lasting many weeks.—W. B. Gabriel, Pr., Jan. '31,115.

5% Carbolic in Oleum Arachis gives good results but exact technique important.—P. G. McEvedy, L. i./32,18.

P. Kennedy Murphy, B.M.J. i./31,1050, issues a strong warning against the method.

℗**Carbolised Olive Oil.**

Phenol 1 Olive Oil to 20 (more or less, if ordered). For burns and scalds.

SCARLET FEVER has been treated by rubbing with 10% Carbolic Oil or Eucalyptus Oil. Tonsils also painted with 10% Carbolic Oil during the first 24 hours.—B.M.J. ii./18,359—but not found effective.

See Therapeutic Index.

℗**Lund's Oil, L.L.** *Syn.* OLEUM LUBRICANS. CATHETER OIL. For oiling catheters, Phenol 1, Castor Oil 4, Almond Oil 20.

Carbolised Catheter Oil has no value.—O. S. Gibbs, B.M.J. i./31,581.

Surgical Lubricant for catheters, &c.

Starch 4, Glycerin 35, add Water $8\frac{1}{2}$; heat to boiling, remove from flame and add Boric Acid in powder $2\frac{1}{2}$, warm to dissolve, and when nearly cold add Phenol 1. The Lubricant is non-greasy and does not attack rubber goods. It can be removed by water. It will not attack metal instruments if left in contact for a short time, but is not intended as a coating to store them in—for this vaseline or liquid paraffin is best.

℗**Catheter Lubricant. Meltzer's Formula.**

Triturate Tragacanth 3 with Glycerin 20, add Water 100, and sterilise, then add Mercury Oxycyanide 0·25.

Gargarisma Acidi Carbolici.

Aqueous Solution 1 in 100 or more. For foul breath and sore throat. E.L. has 1 of Glycerol of Carbolic Acid in 40.

Gauze, Carbolic, 5%, is in 6-yard pieces. **Carbolic Gauze Bandages (Lister's)** are also made.

Gossypium Carbolisatum. *Syn.* **Carbolic Wool.**

To prepare this, impregnate Absorbent Cotton 1, under pressure with 1 of an ethereal solution (5%) of Phenol. Spread out and dry rapidly. **Linteum Acidi Carbolici** is also 5%.

For methods of preparing **Catgut and other Ligatures,** *see Vol. II.*

℗**Glycerinum Acidi Carbolici** (*B.P.* '14). *Syn.* **Glyceritum Phenolis.**

Dose.—(not *B.P.* '14) 5 to 15 minims (**0·3 to 1 Cc.**)

Phenol 1, Glycerin *q.s.* to 5. (U.S. X. has Liquefied Phenol 20, Sodium Citrate 1, Boiling Distilled Water 1, Glycerin 79.) The preparation is *unnecessarily strong* for general local use. It is employed as a throat pigment and is applied to wounds and to ringworm. It has been used in acute middle ear catarrh with good result.

A solution of Phenol in Glycerin is almost non-caustic and only slightly toxic. *See Iontophoresis, Vol. II.*

ITCHING OF ECZEMA, Carbolic Acid 4 grains, Glycerin 40 minims, Alcohol 90% to 1 ounce is often useful, but may irritate.

CARBUNCLES are well treated by applying pledgets soaked in the glycerol. As soon as pus shows, the epithelium is turned back and the part may be later syringed out. Hygroscopic action of the Glycerin prevents fear of absorption.

Ⓟ**Guttæ Pro Auribus Acidi Carbolici N.H.I.**

Glycerin of Phenol 3, Glycerin 5, *i.e.*, 36 grains of Phenol in 1 ounce.

For EARACHE, a few drops of Solution of Phenol, 6 grains to the ounce of Glycerin (**Guttæ Acidi Carbolici**) slightly warmed, are invaluable.—This strength is ample.

Smith's Sterilising Solution. Phenol 20, Sodium Biborate 5, Glycerin 200, Peppermint Water 30, Water to 1,500 parts.

Ⓟ**Ravogli's Liniment.** Carbolic Acid 1, Glycerin 2, Alcohol 90% 16, Rose Water to 32. In skin affections.

Ⓟ**Pigmentum Antisepticum.**

For hay fever. Glycerin of Carbolic Acid 1 ounce, Quinine Hydrochloride 30 grains, forms a useful pigment for the nasal passages.

Solution of Phenol 2% in Spirit is used for diphtheritic membrane.

Ⓟ**Iodized Phenol. Pigmentum Iodi Carbolicum, Acidum Carbolicum Liquefactum et Iodum.—C.H.W.**

Iodine 1, Liquefied Phenol 4. Digest till dissolved. For intra-uterine medication on cotton wool.

Chronic discharging sinuses have been treated by 5 minutes' application of Iodized Phenol, also inoperable uterine carcinoma after curetting. Useful also for ringworm of the scalp.

Carefully distinguish from :—

Dilute Iodized Phenol Injection.

As pigment in diphtheria, or as a gargle or inhalation, a much weaker preparation is made containing Solution of Iodine (Lugol's) 2·5, Phenol 1, Boiling Water to 200. Is useful also as a nasal douche in ozœna, and for intra-uterine injection

Physicians should carefully specify which is required.

Injectio Acidi Carbolici Hypodermica.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Two per cent strength. This has been used for tetanus, erysipelas, and phlegmonous inflammations of the skin.—Whitla.

Ⓟ**Liquor Sodii Carbolatis.**

Dissolve Phenol 8, Caustic Soda 3½, in Distilled Water 100.

To be diluted with 10 to 20 times its volume of water.

These proportions of Phenol and Sodium Hydroxide are nearly the theoretical, the mouth-wash is sharp and pleasant.

Ⓟ**Phenol Sodique** is similar.

FR. CX. has Carbolic Acid 100 Gm., Sodium Hydroxide Solution 20 Gm. (30% by weight). Water to 1,000 Cc. The Sodium Hydroxide in this is insufficient to combine with the Phenol. The FR. CX. preparation, in fact, contains about 8·6 Gm. per 100 Cc. *free* Phenol, only 1·4 of the total 10 Gm. being in the combined condition, whilst the FR. CX. 1884 had the correct proportions to make Sodium Phenate.—W. H. M.

Antiseptic Dental ✱Solubes.

For preparing an antiseptic mouth wash.

Contain Boric Acid, Sodium Phenate, Thymol, Sodium Benzoate, and Aromatic Essential Oils. For prevention of dental caries and in suppurating conditions. One to be used in a wineglassful of warm water.

Pastillus Acidi Carbolici. (Glyco-Gelatin Basis.)
Contains ½ grain (**0·03 Gm.**) phenol. Antiseptic and stimulant. For ulcers in the mouth or throat, and for purifying the breath.

Perles and Capsules of Carbolic Acid. *Dose.*—1 or 2.
Contain one grain (**0·06 Gm.**) and two grains (**0·12 Gm.**) of Phenol in oil.

Pilula Acidi Carbolici.
Phenol 2, Powdered Liquorice 1, Powdered Althæa 1. In grains for one pill, in grammes for 15 pills.

Smelling Salts, Carbolised.
Phenol 24, Ammonium Carbonate 16, Strong Solution of Ammonia 44, Oil of Lavender 1½, Camphor 3, Pine Sawdust (sifted), *q.s.* For coryza, hay fever, influenza, etc.

Anti-Catarrhal Salts.
Phenol 1, Eucalyptus Oil 1, Pumilio Pine Oil ½, Strong Iodine Solution ½, Camphor 1, Ammoniated Alcohol 2, Pine Sawdust 2 or *q.s.*

Ⓟ**Resina Acidi Carbolici,** R.D.H.
Resin 4, Carbolic Acid 4, Chloroform 3. Dissolve and filter.
This is used as an obtundent and a temporary antiseptic filling. *Method.*—Syringe out all food from the cavity and remove as much decay as possible. Apply on a wool pledget to relieve toothache.

Suppositorium Acidi Carbolici (*B.P.* '14).
Phenol 0·8 Gm., White Beeswax 0·5 Gm., Oil of Theobroma, *q.s.* for 12.

Trochisci Acidi Carbolici (*B.P.* '14).
Contain ½ grain (**0·03 Gm.**) with Sugar basis, lemon flavored. For sores in mouth and throat.

Unguentum Acidi Carbolici (*B.P.* '14).
Phenol 3% in White Paraffin Ointment. For ulcers and parasitic skin diseases.
An ointment made with Almond Oil or Adeps Lanæ instead of the Glycerin in the '98 B.P. formula is satisfactory.

Ⓑ Ⓟ **Unguentum Acidi Carbolici cum Cocaina.**
Liquefied Carbolic Acid 20 minims, Cocaine Hydrochloride 10 grains, Soft White Paraffin 1 ounce.

Ⓟ**Unguentum Acidi Carbolici cum Hydrargyri Perchloride.**
Liquefied Carbolic Acid ½ drachm, Mercuric Chloride 2 grains, Olive Oil 2 drachms, Zinc Ointment to 1 ounce.
Both the above are used for pruritus.

Unguentum Acidi Carbolici cum Menthol.
Carbolic Acid 2, Menthol 1, Cold Cream 100.
For eczema with much itching.

Vapor Acidi Carbolici.

20 drops of Liquefied Phenol in a pint of water at 60° C. Inhaled or as a spray, in pertussis and for throat ulcers. It lessens and disinfects the expectoration in bronchitis and gangrenous lung.

Ⓟ**Preservative Solution** for anatomical specimens.

Phenol 1, Glycerin 4, Methylated Spirit 5.

Acidum Sulphocarbolicum. $C_6H_4.OH.SO_3H=174·1068$.

Syn. PHENOL-SULPHONIC or SOZOLIC ACID.

Prepared by the action of strong sulphuric acid on phenol. The *para*-acid is produced in the warm (the *ortho*- when working in the cold), crystallises with difficulty, dissolves readily in water, alcohol, and glycerin, and is a strong antiseptic and disinfectant.

In gingivitis and pyorrhœa a 3% **solution** is useful, reduces swelling and arrests flow of pus.

A 33% **solution** has been sold as **Aseptol**. Principally *para*-acid with only about 6% *ortho*-. To separate *ortho*- and *para*- acids utilise different solubilities of Mono-barium Salts—(SO_3H Salts)—that of the *ortho*- body crystallises out first. The *ortho*- magnesium compound is more soluble than *para*-.

See also Water Analysis, Vol. II. for its use as a reagent for Nitrates.

Cupri Sulphocarbolas.—*Syn.* CUPRI ASEPTOL.

$(C_6H_4OH.SO_3)_2\,Cu + 6H_2O=517·7816$.

In light green crystals, soluble in water, a useful hæmostatic or antiseptic lotion or astringent injection, $\frac{1}{4}$ to $1\frac{1}{2}$%.

CHOLERA has been treated with small doses (1/24 grain per hour).

Sodii Sulphocarbolas (*B.P.* '98). SODIUM PHENOL-PARASULPHONATE $C_6H_4OH.SO_2ONa,2H_2O=232·0872$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**)

In white rhombic crystals, somewhat like magnesium sulphate.

Soluble 1 in 5 of water, in alcohol 90% 1 in 130, by experiment.

Flavoring.—Diluted, it has little taste.

Uses.—In dilatation of the stomach due to flatulence and fermentation. For flatulence, the dyspepsia of phthisis, and in tonsillitis 5 to 10 grains every 2 hours have been given.

Carbolic saturation to prevent the growth of *streptococci* in the circulating fluids. 20 to 25 grains of Sodium Sulphocarbolate needed for an adult every two hours. Treatment is stopped immediately there are any signs of Carbolic poisoning.—T. S. Wilson, B.M.J. ii./27,57.

Mistura Sodii Sulphocarbolatis N.H.I.

Sodium Sulphocarbolate 5 grains, Potassium Bicarbonate 10 grains, Water to $\frac{1}{2}$ ounce.

Zinci Sulphocarbolas (*B.P.* '98). ZINC PHENOL-PARA-SULPHONATE; ZINCI PHENOLSULPHONAS, $(C_6H.OH.SO_3)_2Zn,H_2O=429·5948$.

The commercial salt contains $8H_2O$ (was in U.S. IX.).

Crystals in rectangular colourless plates. ***Soluble*** 1 in 2 of water In Alcohol 90% 1 in 3, by experiment.—W.H.M.

In gonorrhœa and leucorrhœa : 2 or 3 grains per ounce for injection, **Solubes**, 2 and 10 grains (**0·12 and 0·6 Gm.**), produce 2 and 10 ounces or more respectively of lotions for external use or injection.

Tribromophenol.—*Syn.* BROMOL. $C_6H_2Br_3.OH=330·7114$.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in pill.

Manufacture.—By adding Bromine 120, in small portions, to Phenol 53, dissolved in water, *q.s.*, with continuous stirring and recrystallising the product from spirit.

In long silky needles, nearly insoluble in water, soluble 1 in 3 of alcohol 90%, 1 in 1 of ether, 1 in 3 of chloroform and glycerin ; also soluble in fats and oils. M.pt. 85° C. Used alone is strongly antiseptic : ointment (10%), oily solution (1 in 30). Is not dissolved by gastric juice, and is used as an intestinal disinfectant and in typhoid, also in minute doses for cholera infantum.

Bromphenol Bismuth.—*Syn.* **Bromphenobis.** ✱Xeroform. (T.M. 216423/1899.)

$(C_6H_2Br_3O)_2.Bi.OH + Bi_2O_3(?)$. P. Ital. V., P.G. VI., Ph. Ned. V. (also P. Jap. IV. but without formula), P.Helv. has $Bi_2C_6H_3Br_3O_4$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture and Tests, *see* Edn. XIX, p. 20.

A yellowish insoluble powder, with faint odour and taste, containing bismuth oxide and tribromphenol in nearly equal proportions. An intestinal antiseptic, *e.g.*, for cholera.

Bromphenol Bismuth Gauze. 10%, 6-yard pieces.

Phenosalyl.

The Ⓟ following is similar.—Phenol 90, Salicylic Acid 20, Lactic Acid and Menthol of each 1, mix by heat. 0·2—0·4% in conjunctivitis and in eczema 1%.

Trichlorphenol.—*Syn.* Trichlorphenic Acid. $C_6H_2Cl_3.OH$.

White crystals, with pungent taste ; soluble 1 in 1 alcohol, 2 in 1 ether, 1 in 9 glycerin, also in fixed and volatile oils.

Ointment and solution 10% strength are used as antiseptics.

Para-Monochlorphenol. $C_6H_4Cl.OH = 128·496$.

Manufacture.—By passing Chlorine into Phenol 3, kept cool with ice until the product weighs approx. 4. Fractionally distil the product.

Crystalline needles, ***soluble*** in alcohol and ether, but not in water to any extent. M. Pt. 37° C., B. Pt. 217° C. **Liquid** para-Monochlor-phenol is practically identical and is used similarly. The *ortho-* body boils at 176° C. and the *meta-* melts at 28·5° C. and boils at 212° C.

A powerful antiseptic used in treatment of lupus, phthisis, keratitis, iritis, and is also employed in dental work as an analgesic. A paste for filling is made with Cobalt and Tropacocaine Hydrochloride equal parts, with enough Monochlorphenol and Zinc Oxide to produce a paste. The unpleasant taste may be moderated by Menthol.

5 to 10% in glycerin has also been used for laryngeal catarrh. Inhalations $\frac{1}{2}$ to $\frac{1}{4}$%.

Unguentum para-Monochlorphenol.

Para-Monochlorphenol 1, 2 or 5, Soft Paraffin 50, Hydrous Wool Fat 50. Chilblains are well treated with this and solution ; *cf.* Therapeutic Index. To cover the odor we found Lavender Oil 5% useful.

Tri-iodophenol $C_6H_2I_3OH$ has been used for making lotions and gargles.

Bismuth Tri-iodophenol. *Syn.* Neoform.

$C_6H_2I_3.OBiO$. Yellowish powder insoluble in water. Has antiseptic properties.

✱ **Dimol.** (T.M. 408,144, 435,337, 475,397, 478,962). *Syn.* **Dimethyl-methoxyphenol,** $C_6H_2(CH_3)_2(OCH_3).OH = 152·0936$.

Dose.—In 1 grain Tablets (Pulverettes)—2 to 4 with water after each meal; also in *Syrup*, strength 0·3 grain per drachm.

It is described as Dimethyl-methoxyphenol in combination with tri- and tetramethylphenols. The preparation is voided in the fæces unchanged.

It has been well spoken of in dysentery, colitis and intestinal toxæmias generally.

RHEUMATOID ARTHRITIS.—6 out of 10 unselected cases showed definite improvement following treatment.—J. O. Oliver, Nat. Fedn. of T. Unions Rept., May 31,28.

Chronic dysentery, sprue, mucous colitis, intestinal worms, auto-intoxication, etc., treated by coloniclavage, using a solution of 1 to 4 ozs. Dimol Powder in 8 gallons of Hypertonic Saline (4 ozs. of Powder = 1·4 grains per oz.) with good result. An investigation by Cuthbert Dukes showed marked effect on the effluent. At 15 minutes there were 10 organisms and no *B. coli* per Cc. against a control showing more than 200 bacteria and 800 *B. coli*.—W. Kerr Russell, Brit. Jl. Phys. Med., May, '31.

Stated to have a C.A. Coefficient (Rideal-Walker method) of 35.

THE ACTION OF CERTAIN ALLEGED INTESTINAL ANTISEPTICS.—Neither Dimol, Kerol, Izal, or Yatren were found to exert any appreciable effect on the total numbers of living ærobic organisms in the fæces, when administered by mouth in adequate doses. The first three were found to exert on fæces *in vitro* an antiseptic action much greater for coliform bacilli than for streptococci, the concentration of the drugs being considerably higher than in the intestinal tract, which presumably follows their administration by the mouth. Yatren had no evident action whatever in any dilution employed. "Specific and detailed evidence as to the alleged action of these drugs should be published in support of the claims constantly made for them."—L. P. Garrod, B.M.J. i./26,369.

Garrod's conclusions, as far as Dimol concerned, according to the makers of Dimol, are contra to clinical evidence. Method of enumerating bacteria in fæces not accurate to within 100%. Whereas *B. coli* normally present are not affected, the causal infective organisms are destroyed by the drug. *B. coli* count alone thought of no value.—B.M.J. i./26,505.

Dimol Ointment useful for cuts and abrasions, and for insect bites in the tropics.

Dimol Dentifrice, Pastilles and Dusting Powder are also made.

ACIDUM CARBONICUM.

CARBON DIOXIDE, CARBONIC ANHYDRIDE. CO_2=44.

Carbon Dioxide in the gaseous condition in small percentages has been advocated for use therapeutically, *i.e.*, when used in dilutions of 4 to 6% with air it stimulates expiration, acts as a cardiac stimulant, exerts an indirect effect as a sedative and possesses the property of toning up a weak pulse. It has been used after an anæsthetic and operation.

It has also been inhaled in ozæna and nasal catarrh. It is believed to act as an antiseptic in such cases.

To accelerate pulmonary elimination of poisons or drugs, *e.g.* Carbon Monoxide, Ether and Alcohol. Valuable in treatment of empyema.—L. i./26,1052.

In general anæsthesia as an aid.—J. S. Lundy, Jl.A.M.A. ii./25,1953.

Carbon Dioxide 5% ***with Oxygen*** 95% (some employ even 25%) as a control of respiration in anæsthesia; also in asphyxia of the new-born, alcoholic intoxication and Carbon Monoxide asphyxia. The mixture is not used "straight" but is added to air or Oxygen from another cylinder.—Yandell Henderson, B.M.J. ii./25,1170; see also *ibid.* 1181 *et seq.* and 1186.

Also to prevent collapse of lungs following drowning. 7% is usually sufficient.—Y. Henderson, B.M.J. ii./31,689. *See also* **Poisons and Antidotes—Asphyxia.**

Carbon Dioxide and Oxygen to prevent atelectasis. Important prophylactic in operations.—La Fleche, B.M.J. ii./30,526.

ANGINA PECTORIS benefited by inhalation daily for 15 minutes from an open mask.—B.M.J. E.ii./31,26.

In PNEUMONIA and asphyxia from other causes, *e.g.* electric shock and drowning, has been advised in U.S.A. In pneumonia it has been thought in the past necessary to eliminate every particle of Carbon Dioxide from the lungs.

Perirenal inflation with 500 Cc. of CO_2 or oxygen (CARELLI Method) ——former in preference as it is rapidly absorbed. The procedure is of utility for taking X-ray photos.—F. Hernaman-Johnson, B.M.J. i./22,91.

'Carbonic Snow' *i.e.*, Carbon Dioxide in the semi-solid condition, formed as the gas evaporates from a storage cylinder, is much employed therapeutically.

The procedure is known as **Refrigeration** or **Chrymotherapy** (κρυμός=frost). The cylinders contain CO_2 at a pressure of about 950 lbs. to the square inch (65 atmospheres), yield the snow on opening with a temperature −79° C. (−110° F.), which by collecting in a suitable receptacle can be formed into a stick or crayon like an ordinary candle, or may be compressed into a mould and cut any shape with a knife. The cylinders should be mounted on a stand with the stopcock on a lower level than the opposite end so that the liquid gas covers the inner orifice of the valve.

Crayons, Method of Making.—The snow evaporates slowly—a crayon 5 by 1 inch will last about 1 to 2 hours. As many as thirty applications with this size can be made. The temperature of the crayon is *constant.* A towel is folded into three and wrapped round an ordinary ruler—the ruler is then removed and the tube thus produced is bound on to the valve of the CO_2 Cylinder, the gas is turned on and the towel tube fills with the snow. The frozen gas may then be pressed into a piece of Vulcanite or Celluloid Tubing about 1 inch in diameter with a ruler. A cardboard postal tube or roll of blotting paper (several thicknesses) will also serve. Cover end of crayon with lint for handling. Can be pointed with a pen-knife or shaped by rubbing against the side of a vessel, *e.g.*, copper steriliser—containing hot water.

An old glove finger has been suggested for collecting the CO_2 by tying on to the vent of the cylinder. When completely filled and rigid, remove and with a sharp knife cut the end of the finger off at about 1½ inches from the point, thus exposing a corresponding length of the crayon, which can be used to the part, the rest of the glove finger serving as a holder.

Hall-Edwards' Collector and Applicator.—A metal syringe-like apparatus convenient in use. Ref.—C.D. ii./10,387, *v. also* L. ii./11,87. Fully described E.P. Edn. XIX, p. 23.

Uses.—For removal of nævi, moles and blemishes, lupus erythematosus, lupus vulgaris, rodent ulcer, and warts (for last mentioned long application necessary). Also employed for trachoma and chronic localised eczema. A single application usually suffices. The thawing out is usually more painful than the freezing.

ALOPECIA AREATA of 3 to 7 years' duration well treated. Hair grew after three or four applications within 3 weeks.—Per Jl.A.M.A. ii./25,552. See also Pres. Jan. '26/35.

CHRONIC LOCALISED ECZEMA.—The method may be applied energetically in trachoma without risk. The lid is everted and separated from the globe by a non-conducting spatula—the pencil is lightly pressed down on to the part of the conjunctiva to be treated for 15 to 30 seconds.

CORNEAL ULCERS.—The surface of the ulcer is carefully touched. Cocaine is not necessary. If patient complains of discomfort the eye can be bathed

with cold boracic lotion. The surface of the ulcer becomes white and raised within twenty-four or thirty-six hours this 'slough' separates, leaving a clear healing ulcer. Infiltrations disappear from the surrounding healthy cornea and hypopyon vanishes. After treatment, pads and bandages are used instead of fomentations, and atropine sulphate 1% is instilled once daily. The method is not advised for marginal or ring ulcers.

GENERAL PSORIASIS.—Patches removed by 30 seconds' application.

HÆMORRHOIDS.—Carbon Dioxide satisfactory.—B.M.J. i./12.120.

KERATOSIS accompanying 'X' ray dermatitis. Brief applications answer well. The treated area becomes firmer and in two or three minutes swollen. A wheal forms with acute hyperæmia within half an hour and a vesicle usually within an hour, applying thirty seconds or longer, this will almost certainly be followed by scarring. An intense superficial destruction is obtained by a second application immediately after the tissues have thawed out.

Boric Acid Ointment is used for after-treatment. If blister forms the fluid is removed within a few days, the crust forming should be allowed to fall off. The scar ultimately is pale, soft and pliable.

NÆVI.—In the case of an ordinary capillary nævus the crayon is roughly shaped to that of the nævus—or slightly larger; it is applied and firmly pressed down for, on an average, 40 seconds. If there is bone immediately beneath, a shorter time will do. For a cavernous nævus the end of the crayon is made the same size or slightly smaller than the area of the growth. A long application with deep pressure should effectually freeze the whole mass.

ORIENTAL SORE.—Perseverance is necessary as there is strong tendency to recur.

For large port wine stains and moles where many applications would have to be made LIQUID AIR (*q.v.*) is said to be more satisfactory.

As a preservative of eggs the gas is useful.—H. E. Jones, B.M.J. i./26,848.

For details of the presence of excess of CO_2 in the air and its effect on the human organism on inhalation, see Oxygen.

ACIDA CHLORACETICA.

Acidum Monochloraceticum. $CH_2Cl.COOH = 94{\cdot}4804$.

Preparation.—By Chlorination of Acetic Acid in presence of Iodine at water-bath temperature, subsequently fractionating and reserving the 180°—188° C. fraction.

Deliquescent white crystals, M. Pt. 63° C., or liquefied. It blisters the skin, and is a caustic for warts and corns. ***Soluble*** with ease in water, alcohol, and ether.

In the electrolysis of Sodium Chloride, as used in treatment of gonorrhœa, this acid is less decomposed than the salt, and it is able to neutralise the alkalinity which would deposit against the urethral membrane, *cf.* Gonorrhœa, Therapeutic Index.

Acidum Dichloraceticum. $CHCl_2.COOH = 128{\cdot}9296$.

A colourless caustic for venereal sores.

Acidum Trichloraceticum. **U.S. X., P. Helv., Ph. Ned.V., P. Jap., F.E. VIII.** $CCl_3.COOH = 163{\cdot}3788$.

Prepared by chlorination of acetic acid, or by the action of fuming nitric acid on chloral hydrate.

In deliquescent crystals, M. pt. 55° C. (lower if moist), and boiling at 195° C., very soluble in water, alcohol and ether.

Uses.—A quick escharotic for venereal and other warts. As lotion or gargle, 1 to 5% aqueous solution may be used, and as strong as 1 in 1 or 2 of glycerin with a little iodine and potassium iodide has been employed for temporary application.

In gonorrhœa, solution 1% or less is used. Tobacco stains on the teeth can be removed by its cautious use (25% solution).

RIGG'S DISEASE—incipient stages—this acid applied to the gum after cleaning with Hydrogen Peroxide Solution 10 or 20 Volume, is a good remedy. The action is probably dual—killing the infective organisms and dissolving the Calcium Carbonate of the tartar. With the disappearance of the tartar the presence of bacteria is excluded. Should be tried before sound teeth are sacrificed.

TONSILS, DISEASES of.—Where operative treatment is not permitted, the use of Trichloracetic Acid applied on a right angled wool-carrier and passed deeply into the crypts, has been found of value in reducing the size of the tonsil and adding to the comfort of the patient.

VINCENT'S ANGINA.—Trichloracetic Acid stated to be specific.—T. J. Gallaher, Pres., Aug., 1920. Chromic Acid applications (saturated solution) also advised. Afterwards gargle with water, later with Hydrogen Peroxide diluted 1 : 10. Further bibliography *ibid.* Feb., 1921,63.

LEPROTIC LESIONS treated with applications of a solution—1 in 1 for centre of large thick nodules, 1 in 5 for painting on face, and 1 in 3 generally useful. Must not be too strong or brush too wet. When dry, skin should show a white powdery appearance, otherwise repeat 2nd or 3rd time. May be repeated after 10 days.—E. Muir, I.M.G., May, '26,216.

RODENT ULCER.—A solution of Trichloracetic Acid, 3 drachms in 20 minims of water, applied.—The acid should be washed off after about 3 minutes, and then for 24 hours no soap or water is allowed on the ulcer. The eschar usually peels off in about 22 days.—H. Leslie-Roberts, B.M.J. i./27,794.

LARYNGEAL TUBERCULOSIS treated by Trichloracetic Acid—thought specific. The infection is secondary to pulmonary tuberculosis.—B.M.J.E. i./30,7.

For its use as a delicate test for albumin, v. Vol. II.

ACIDUM CITRICUM.

$C_3H_4OH.(COOH)_3$, H_2O=210·078.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless crystals or white powder, 99·5% pure.—**B.P.'14** and U.S.

Lemon juice contains as much as 7 to 9% (30 to 40 grains per ounce).

Soluble.—2 in 1 of water, 1 in 2 of glycerin, 1 in 1½ of alcohol (90%), 1 in 8 of ether, Sp. Gr. 0·735, but much less soluble in 0·720 ether.

For quantities of alkalis to be prescribed with this acid in the form of effervescing mixtures, *vide* NEUTRALISATION TABLE.

Uses.—Relieves thirst in fever. Lemon juice is better than citric acid for scurvy.

In rheumatism and given internally in jaundice.—H.

Diminishes coagulability of the blood (Sir A. E. Wright). *Vide* also Calcium Chapter and *Vol. II.*

To replace Hydrochloric Acid, Citric Acid recommended where it is desired to administer acid to bring acidity of the urine to normal. The amount required would be roughly 7 Gm., in the case of a neutral gastric juice. It can be given in pill form.—B.M.J.E. ii./22,78.

Organic acids, *e.g.*, Citric, Acetic and Tartaric in form of salts suggested for all types of protozoal infections; malaria, Leishmania infections, trypanosomiasis, spirochætoses. These acids are thought to act as powerful katabolic poisons to malarial parasites. Kala-azar parasites experimentally flourish and multiply in citrated blood at 20° C. but die out rapidly at 40° C. Numerous cases of malaria treated without Quinine on these lines, also amœbic hepatitis, without Emetine.—S. L. Rodrigues, Bombay, May, 1922.

Incompatible with potassium tartrate and alkaline carbonates.
Impurity.—Lead should not exceed 20 parts per million (**B.P.'14**).

Lotio Acidi Citrici et Phenolis. Citric Acid 3 drachms, Phenol ½ ounce, Water to 1 pint. For cleansing sockets after removing septic teeth.

Acid fruit tooth paste better than soap and chalk.—B.M.J. ii./26,864.

Ⓟ*ACIDUM CRESYLICUM.

Cresol (*B.P.*'14). *Syn.* **Cresolum Crudum**, CRESYL, PARACRESYLOL. CRESYL HYDRATE, METHYL PHENOL, METHYL HYDROXYBENZENE, "COMMERCIAL CARBOLIC ACID," &c., $C_6H_4.OH.CH_3$ = 108·0624. KRESOLUM CRUDUM P. HUNG, is "ACIDUM CARBOLICUM FLAVUM 100%."

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

A yellowish brown liquid with tar-like odour.

A mixture of ortho-, meta-, and paracresols, forming the principal constituent in crude carbolic acids. **Ortho**-cresol (1 : 2) melts at 31° C. and boils at 188° C. **Meta-** (1 : 3) is a colourless liquid, boiling at 201° C. **Para-** (1 : 4) melts at 36° C. and boils at 198° C. Sp. Gr. 1·04 to 1·05. When distilled 90% should boil at 195 to 205° C.

A definition of ***Medicinal Cresol*** is needed.—C. E. Sage, P.J. ii./30,2.

FR. CX. requires, in the following proportions: Ortho 35, Meta 40, Para 25. P.G. VI. and P. Belg. IV. (Cresol Brut) require at least 50% *m*-cresol $C_6H_4.OH(CH_3).(1:3)$, also that at least 92% must distil between 199 to 204° C. Method of estimating by converting into Trinitro-*m*-cresol is given in the former.

Cresolo Grezzo, Ph. Ital. V. The bulk must distil between 180 and 204° C.

Separation of m-and p-Cresol.—Process depends on the fact that only Calcium *m*-Cresoxide is decomposed when the Calcium Salts of *m*- and *p*-Cresol are treated by superheated steam at 105—110° C. *m*-Cresol alone distils over.—Terrisse and Dessoulavy (D.R.P. 267210), ex J.C.S.A. i./14,38.

Manufacture of Phenols and Cresols from Gas Wash Liquors. At present there is more Cresylic Acid available than can be sold.

Separation of Cresols—methods kept trade secrets.—W. G. Adam, P.J. i./31,461.

For Tests to distinguish Carbolic Acid, Cresols and other Phenols, and further Analytical Data, see Vol. II.

Soluble 1 in 50 water (*B.P.*'14), we find mostly 1 in 70. Miscible with alcohol 90%, chloroform, ether, castor oil, and glycerin in all strengths. Also miscible with almond and olive oil in all proportions, but to make a clear solution we found about 1 in 2½ necessary.

Uses.—The mixed Cresols are less potent in action than Phenol (considered one-eighth as poisonous) and are used in many respects on analogous lines to the latter. Their odour is a disadvantage. "Cresol" is valuable for vaporising into the air in the treatment of whooping cough. Cresol is largely employed in the manufacture of Liquor Cresol Saponatus (*B.P.* '14) and other disinfectants as described later. A small proportion (0·5%), preferably freshly distilled, is much used as an antiseptic to add to vaccines.

Post-influenzal cough cured by inhalation of Lysol—about 1 drachm to 4 ozs. of boiling water.—C. Higgens, L. i./15,1204.

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* But see first par. Acidum Carbolicum.

Disinfectants.

The nomenclature used by manufacturers in describing their preparations includes the following :—

"*Tar Acids.*"—These are Oxygenated Hydrocarbons including Phenols, Cresols, and higher Hydroxy compounds.

"*Phenoloids.*"—A vague term. The bodies so called *simply consist of phenol and its higher homologues, i.e.*, Xylenols and Dimethylhydroxybenzenes. They are more bactericidal and less poisonous, and they make good emulsions with soap and water.

"*Tar Oils.*"—The neutral bodies present, *i.e.*, insoluble in soda.

"*Coke Oven Oils.*"—Contain varying percentages of "Phenoloids" with Tar Oils."

Disinfectants containing less than 3% Phenol and homologues sold at grocery shops and stores are relatively useless. The public should be protected. More disinfectants are sold by grocers than by chemists.—H. Kenwood, L. i./21,1327.

℗ **Liquor Cresolis Saponatus** (*B.P.* '14).

Mix Cresol 50 by weight with Castor Oil 35 by weight. Heat to 80° C. Dissolve Potassium Hydrate 8 in Water 7, mix and heat until 1 vol. mixes clear with 10 of Water. Cool and add Water to 100 by volume.

Many formulæ have been published—some employing Linseed Oil, as in the original Lysol. Others proceed without heating, making the Potash Soap first by shaking, adding a proportion of Alcohol and finally the Cresol little by little. Others suggest an equivalent smaller proportion of *Soda* instead of potash. As the result of many experiments we find *the B.P. method good.* The P.G. VI. method, which can be completed at room temperature, is also satisfactory, *vide infra.*

To make a *clearly* soluble article one must use the best potash and Cresol. Soda and Castor Oil will produce a clearly soluble Liquor if the Soda is good, but we do not favour the suggestion to use soda.

Preparations making a *milky emulsion* with water were favoured in the past.

P. Off.—Linseed Oil to be used.

Points of value in Cresols for making Lysol.—N. Glass and A. J. Jones, P. J. ii./31,76.

Liquor Cresolis Compositus, U.S. X., is prepared by warming to 70° C. Cresol 500, Linseed Oil 350, with 10 × Normal (Dekanormal) Caustic Potash 22 and 10 × Normal Caustic Soda 88, finally adjusting to 1,000 with water.

Liquor Cresolis Saponatus, P.G. VI., contains 3% by weight of Alcohol (of strength 90% by vol.), and is made as follows :—

Add a solution of Caustic Potash 27 in Water 41, with shaking, to Linseed Oil 120, and then Alcohol 12. Shake frequently at room temperature until saponified. Finally, add Cresol 200 and shake. (All parts by weight.) It may be necessary to allow to stand a day or so.

W. Knight also advises saponifying with the use of spirit, overnight.—P.J. i./26,409.

These solutions are ***incompatible*** with acids.

The **Lysol Patent** specification, 1017/1890 (expired) gives the following methods of preparation :

(i). Tar Oil 100 Gm., Linseed Oil 100 Gm. Caustic Potash Solution (1 in 2) 75 Gm., Alcohol 65 Gm. Boil with reflux condenser until saponified.

(ii). Tar Oil 40 Gm., Common Resin 10 Gm., Caustic Potash Solution 70 Gm., Alcohol 70 Gm.

A "Lysol" must contain about 50% Cresols. Products con-

taining 3% or less of Cresols, to be sold by grocers, etc., must not be labelled "Lysol." Result of Lysol, Ltd. *v.* Freesol Co., July 15, 1925.—P.J. ii./25,85,91.

***Marshall's Lysol** (T. M. 428670, 441893, 98947) found to contain 44% Carbolic Acid, but that is not inconsistent with its containing 50% Cresylic Acid.—H. N. Linstead, P.J. i./30,205.

Has quick and effective action on *S. aureus*, *S. pyogenes*, and *S. hæmolyticus*, using 2 : 100 dilution for the hands and 1 : 100 for the patient's body.—L. i./31, 590. The dilution recommended by the makers for vaginal douches is 1 in 400, and no figures are given for the disinfectant action of Lysol in this dilution.—L. P. Garrod, *ibid.* 729.

Antiseptics in Midwifery.

The **Central Midwives Board** and the **L.C.C.** drew attention to the variation in bactericidal power of Lysol preparations and the strengths for use variously stated, but the Board, while giving the view that its use should be discontinued, gave no advice as to what should take its place. (Biniodide well spoken of by J. Gutch, B.M.J. i./30,359.)

The germicidal action of Lysol, *e.g.*, in midwifery on streptococci *e.g.*, S. pyogenes *is wholly inadequate* in the dilutions which its caustic properties demand for clinical use. The best agent is that which destroys the organism in the highest dilution relative to the minimum tolerated by the tissues in the shortest time under simulating conditions. *No Lysol can be other than a delusion. Lysol is only active on Gram-negative bacteria.*—L. P. Garrod, B.M.J. i./30,413.

An investigation employing *Streptococcus pyogenes*. If prophylaxis can be served by merely ***bacteriostatic action,*** Acriflavine is the most powerful agent. Adequate proportion would have to be maintained in the birth canal for several days. Few germicides possess adequate ***bactericidal action. Brilliant Green*** is the surest safeguard against streptococcal infection (kills in 1 in 10,000 dilution). Next in order are Monsol, Izal, and Cyllin. Acriflavine, Rivanol, and one brand of Lysol are on the borderline. *Lysols when diluted to* 1 *in* 400 *have little margin of safe use.* Other Lysols, Mercurochrome, and Mercury salts found ineffective.—L. P. Garrod, B.M.J. i./31,572.

The **Central Midwives Board** recommend (reissued from the L.C.C.) continued use of ***Lysol provided it contains 50% Cresol.***—L. P. Garrod, B.M.J. i./31,572.

The disinfecting power of the higher phenols increases in proportion to their position in the homologous series, but their solubility *decreases* proportionately. Bodies, therefore, with the *hypothetical* diphenyl nucleus which have become so popular can only be used as *emulsions* made with vegetable or with Tar Oils, Glue, etc. The use of Alcohol to dissolve reduces activity.—Hewlett.

Cresol Soap solutions are effective in proportion to their content of Phenols as shown by chemical analysis, and presence of organic matter calls for increase of strength, the ratios of increase being for pure Carbolic Acid 1·4, for Cresol Soap solutions 2·4, and for emulsions 8·2.—B.M.J. ii./26,1133.

Poisonings. Many cases are recorded, *e.g.*, the following :—

Apparently about ½ ounce taken. Recovery after vomiting and a dose of Magnesium Sulphate. The copious vomiting and 3 glasses of milk which had been taken were probably the saving factor. Lavage not conducted.—B.M.J. i./13,19.

In 1927 the deaths from Lysol poisoning were : by accident, 13 : by suicide, 361.—L. ii./28,203. In 1928 the number of deaths was 287.—P.J. ii./29,274.

Frequency of Lysol poisoning remarkable. If antidotes were given on the bottle it might lead to saving of life.—Coroner (Clitheroe), P.J. ii./30,214.

Sulphates, best given as Magnesium Sulphate, render Carbolic Acid inert and prevent its action on tissues.—E. B. Leech, L. i./27,452.

Antidotes.—Give Saccharated Lime-Water freely, then wash out the stomach or induce vomiting by mustard and water; Olive Oil;

Barley Water may be given after. Strychnine hypodermically and Oxygen inhalation.—Barts. *See also Acid Carbolic.* On no account give water except by lavage.

Comparative poisonousness with Phenol.

Lysol usually considered one-eighth as poisonous as Phenol. Brandy given as enema, with recovery, in a case when 2 ounces had been taken.—B.M.J. ii./25,774.

Acute pancreatitis following Lysol poisoning (taken *per os*).—V. Dellal, L. i./31,407.

The following are some Proprietary and Cresylic disinfectants :—
With regard to Ⓟ *see also first par. in Acid Carbolic chapter.*

Ⓟ ✱**Acrosyl** (T.M. 437105, Class 3).

Ⓟ**Clearsol** (Canadian T.M. 212, folio 46308).

A Cresylic disinfectant forming solution in water. Has R.W. Coefficient 3 to 4, and by the Hygienic Laboratory Method 2 to 3. The preparation is on the Canadian market.

Ⓟ ✱**Cofectant** (T.M. 349583 Class 3.). 307885, 310359, 349582, Class 2. 349585, Class 48.

Ⓟ ✱**Creolin** [T.M. 87839 and 92050 (Class 3), also 81450, 87838 (Class 2) and 161927 (Class 48) and 161924 (Class 1)]. (✱Creoline is T.M. 214446, Class 2, ✱Pacolin 305633).

Ⓟ **Creophen** (Ferris).

Ⓟ ✱**Cyllin** [T.M. 256051, 258990 and 299502 (Class 2), and 259683, 264589 (Class 3)] **Medical.** *Dose.*—1 to 5 minims **(0·06 to 0·3 Cc.).**

Unguentum (Creolin) Cyllin Compositum.—Cyllin ½, Soft Soap 1, Ammoniated Mercury Ointment 4, Soft Paraffin 8.

In chronic eczema 1 in 200 with Lotio Calaminæ Oleosa.—B.M.J. i./09,1341.

The Rideal-Walker Co-efficient for Cyllin in respect of *Staphylococcus Pyogenes Aureus* is 9·37.

Cyllin Syrup.—*Dose* for adults 10 to 60 minims, for infants 5 to 10 minims. In infantile diarrhœa encouraging.

Ⓟ**Cyllin Capsules.**—1 and 3 minims keratin-coated, have been used in summer diarrhœa, dysentery, colitis and sprue. 'Stomachic' are also supplied.

Ⓟ**Diffusol, Lysol-Martindale.**—A soapy solution containing 50% specially purified ortho-, meta- and para-cresols soluble in water in all proportions. For general surgical use dilute to 1%. For instruments 2%. For utensils 5%.

The diffusible and penetrating properties of this preparation were referred to in the 1915 Hunterian Oration by Sir Watson Cheyne.

The penetration diffusibility is determined by means of **Edmunds' Cell**—an ingenious apparatus employing a slab of Agar culture medium with the Test organism brushed on one side and the antiseptic to be tested on the other. The area of no growth corresponds with diffusibility and penetration of the antiseptic. Diffusol was found superior to foreign made Lysol.

For mucous membranes 0·1% or 10 minims to the pint approx. is efficient.

For coughs and throat irritation 20 minims added to 1½ pints of water at 149° F. and inhaled, *e.g.*, in a Portable Inhaler.

✱**Hycol** (T.M. 305595, Class 2, also 414679, Class 3). The preparation is said by the makers to be "non-poisonous."

Hycol has R.W. Coefficient 18-20.—L. ii./29,895.

Hycol Medical is also made. *Dose* internally : 1 to 3 minims in cholera. A tar product containing 38% "Phenoloids" (200° to 305°) C.A. Co-efficient on *B. Typhosus* is indicated as 24-26. Used in dilution 1 in 10,000 in blepharitis to as strong as 1 in 5, *e.g.*, in favus and lupus. In diphtheria as spray 1 in 1,000, in gonorrhœa 1 in 1,000 to 1 in 200 : to wounds 2 to 5%. In gynæcology 1 in 400.

Ⓟ**Hypro** (Canadian T.M. 212, folio 46307).

A white emulsified disinfectant similar to Hycol. Has Rideal-Walker Coefficient 18-22, and by the Hygienic Laboratory Method 15-16. The preparation is marketed in Canada.

Ⓟ✱**Izal** (T.Ms. 171127, 300079, 443284, Class 2; 171643, Class 1; 171812, Class 3, and 443285, Class 3) (**Medical**); 516485, Class 3; 245827, Class 42; 171813, 443286, Class 47; 171814, 443287, Class 48.

Dose.—15 to 60 minims in ½ to 1 ounce milk or water.

For use, 1 in 200 of water, is employed. An emulsion of Polymethylhydroxy Benzenes, with Phenol Coefficient of 18. A 1 in 3,000 dilution in warm water kills *S. hæmolyticus* and *B. typhosus* in 30 seconds. Active in presence of body fluids, non-toxic compared with Lysol, does not oxidise, is not impaired by tap water, is non-staining, and does not harm the skin.

PUERPERAL SEPSIS.—Mortality reduced from 46% in treatment of 79 cases by general means alone to 23% in 86 cases treated by currettage and active disinfection of the uterus with Izal.—D. S. Sutherland (Monsall Fever Hosp.), Jl. Obstet. & Gynec.

Capsules of Izal (plain), 2 minims and Izal 2 minims **with Cod Liver Oil** 5 minims are supplied for use in phthisis.

Izal, with Bismuth Subnitrate and Chloromorphine Solution, is useful in dysentery.

Izal Fluid containing the same amount of impure Izal Oil is also supplied.

Strength of 1 in 400 disinfected *Staphylococcus pyogenes aureus* in pus in 15 minutes—in a simple broth culture 1 in 600 will do the work in 5 minutes.

Pharmaceutical Socy. *v.* J. Brown (a grocer). Appeal dismissed concerning sale for 'excepted' purposes.—P.J. i./32,389,402; C.D. i./32,527.

Ⓟ✱**Jeyes Fluid Disinfectant** (T.M. 66985), Class 3; 42495, 51937, 524391, Class 2, 521784, 81826, 81977, 154330, 186844, 204987, 206486, 465216, Class 2; 66987,521784, Class 48. Contains Cresols with Resin Soap.

Ⓟ✱**Jeyes Soluble Fluid** (✱**Jeysol**. T.M. 385267, Class 2) differs from the Fluid Disinfectant in mixing clear with water. It contains 50% Cresylic Acid.

Ⓟ✱**Kerol** (T.M. 275140, Class 2, and 469285, Class 3).—Claimed to be a non-irritant germicide. R. T. Hewlett reported this preparation slightly less toxic than Lysol.

1 in 180 is germicidal to Tubercle Bacilli in three hours even when dried.—W. G. Savage. Ⓟ**Kerol Capsules** are used as intestinal antiseptics.

Ⓟ**Kresapol** (Ferris).

Ⓟ✱**Lycryl** (T.M. 363297, Class 2). 50% Cresols.

Ⓟ✱**Lysol** (*cf. antea*).

Trade Mark 98947 and 98948, removed from Register (avoided) under Patents, Designs and Trade Marks (Temporary Rules) Act, 1914; *cf.* Patents, etc. (Temp. Rules) Act, 1914.

Lysol was the name of an article made according to an expired patent. When a patent expires the name of the patented article becomes public property. The name, however, remained on the Trade Mark register until, removed under the Temporary Rules Act, 1914.—C. D. Feb. 20/15. See also result of Lysol, Ltd. *v.* Freesol Co. under Lysol *antea*.

The following are now (1931) *on the Register.*—98947, B433040, 509951, 428670, B415189 (2); B406947 (3); 313061 (47). ('B' *means Limited Protection.*)

T.M. 406947, Class 3, applies to Marshall's Lysol Hair Wash, and was obtained on the device of a label, not on the name Lysol.

Ⓟ✱**Microbene** (T.M. 299709, also 321586, Class 2). 50% Cresols.

Ⓟ✱**Monsol** (T.M. 455799, 501707, Class 3; 485798, 501706, Class 2). Stated to be prepared from new oils obtained in the gasification of coal by the Mond Power Gas Process. They resemble the Phenols and have germicidal powers, but are less toxic and less irritant.

Uses.—As an antiseptic for wounds, Monsol stimulates phagocytosis and promotes granulation. For a dressing a 1 in 200 solution. For douchings, irrigation, etc., use 1 in 500, gradually increasing to 1 in 250; for packings and tampons, and for instruments, use 1 in 20.

In midwifery is stated to reduce incidence of puerperal sepsis and to have selective action on Gram+ organisms, and to be 10 times as powerful as Lysol. Has special action on *S. hæmolyticus*—1 in 1,500 is stated to kill. It is non-irritant to mucous membranes and tissues.

Monsol Germicidal Ointment for streptococcal and other forms of dermatitis, and for septic sores, impetigo, eczemas, ringworm, etc.

Monsol Capsules are prepared for alimentary antisepsis, and the pastilles are stated to be expectorant, demulcent, and stimulating, as well as germicidal

Monsol Throat Pastilles, according to the makers, contain Rectified Oil of Tar $\frac{1}{15}$ minim, Oil of Aniseed $\frac{1}{8}$ minim, Oil of Orange $\frac{1}{20}$ minim, in a sugar basis.

Ⓟ✱**Pacolol** (T.M. 328008, Class 2, and 328009, Class 3.)

Ⓟ✱**Trikresol** (T.M. 216094, Class 3), a specialty of the three cresols. It is a colourless liquid, slightly soluble in water, said to have three times the germicidal power of Phenol. For surgical use, $\frac{1}{2}$ to 1% solution. As an eye wash 1 in 1,000 or 2,000.

Ⓟ**Trikresol-Formalin.** These substances, in proportion of 4 to 1, form a useful application as a dental dressing.

1% Trikresol is an effective solution for rendering the tooth-brush free from the common pathogenic organisms.

For the Lancet and Rideal-Walker methods of standardising Disinfectants B.P. Conf. Discussion and modifications of the methods, see Vol. II.

Amyl-Meta-Cresol.—Brit. Pat. 330,333 (1929). A new powerful antiseptic of low toxicity, the outcome of research on the effect of Alkyl groups on Phenols. A colourless solid substance, M.pt. 24° C., with pleasant odour and taste, sparingly soluble in water, insoluble in Alcohol, Ether and oils.

Has marked lethal and inhibitive effect on bacteria and moulds. 1 in 20,000 and 1 in 25,000 inhibit growth of *B. coli* and *Penicillia* moulds respectively. As a urinary antiseptic it offers great promise.—F. L. Pyman, C. E. Coulthard, J. Marshall and Co-workers, Boots Res. Lab., Apl., 1931.

Phenol Coefficient of from 200-300 against *B. typhosus, streptococcus* and *staphylococcus*, low toxicity and pleasant taste. Suitable as mouth-wash, and possibly as urinary antiseptic.—F. L. Pyman, L. i./30,759.

It is of interest to remark that Thymol, one of the most potent antiseptics, is Iso-propyl-meta-Cresol.

Compound Glycerin of Thymol Pastilles with Amyl Cresol added, are made.

ACIDUM FORMICUM (P.G. VI.).

Syn. **Aminic Acid.** H.COOH=46·0156.

Dose.—2 to 10 minims (**0·12** to **0·6** Cc.) *per os* freely diluted, *e.g.*, with mineral water. Hypodermically 2 to 15 minims of 1 in 1,000 dilution of actual acid, but it is intensely irritating. It is better given as Sodium Salt.

A colourless liquid Sp. Gr. 1·061—1·064 (24 to 25% H.COOH). Miscible with water. In concentrated form has a caustic action.

Note :—Formic Acid is obtainable also of Sp. Gr. 1·12=50%, 1·15 =65%; 1·2=85%; 1·22=100% H.COOH. As a rule the 25% Acid is referred to.

Uses.—It is alleged that this acid (acting in a manner similar to cantharides) gives tone to the muscles and restrains muscular tremor, as in cases of paralysis agitans, and in chorea. It increases muscular energy and abolishes the sense of fatigue. It is employed usually as one of the salts, *e.g.*, in influenza, gout, rheumatism, tremors, etc.

The acid was originally made from the Red Ant, *Formica rufa.* The stinging nettle, *Urtica dioica*, contains formic acid, and has long been employed as a tonic and diuretic.

Succus Urticæ is prepared in strength 1=1.

Dose.—1 to 4 drachms increased if desired. The juice expressed from the fresh plant, preserved with 25% of 90% Alcohol.

Formic Acid is stated to be produced by the growth of *B. rheumaticus* and is a considerable constituent in sweat. *cf. Vol. II.*

Rheumatism, it is said, has been cured by applying bees to joints. Bee keepers it is said are remarkably free from rheumatism.

Sodii Formas, H.COONa=68·0048.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, increased if desired to as much as 60 grains (**4 Gm.**) per diem.

A white alkaline powder soluble in water. A strong reducing agent and powerful antiseptic. *Incompatible with Acids.*

T. Tyrer and F. C. Gosling found 2 H_2O in the crystalline salt.—P.J. ii./12,157.

Uses.—In cases of heart and kidney diseases it is stated to lessen the loss of albumin by the urine, although it has diuretic powers. Does not disagree with the stomach. Said to be non-toxic. Has been employed in phthisis and in pneumonia. Improves appetite, mental and physical activity. Ocular fatigue has been treated with sodium formate instillation 1 in 50 to 1 in 30. Rheumatism has improved by 15 grain doses.

Diphtheria has been treated with 5 to 10 minim doses of 25% solution in water every 4 hours.

Sterules of Sodium Formate contain $\frac{1}{8}$ and $\frac{1}{2}$ grain. As much as 5 grains (**0·3 Gm.**) in 2 Cc. has been given.

Elixir Sodii Formatis. *Dose.*—2 drachms (**8 Cc.**).

Sodium Formate 4, Vanilla Essence, *q.s.*, Simple Syrup to 100.

Calcii Formas, $(H.COO)_2Ca$=130·0956.

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

White crystals soluble 1 in 10 of water. More permanent than the Sodium Salt. For hæmorrhages has been found useful.

Sterules of Calcium Formate contain $\frac{3}{4}$ grain (**0·05 Gm.**).

Ferri Formas. (**Ferric Formate.**)

$Fe_3(OH)_2.(HCOO)_7.4H_2O$=588·6526.

Dose.—$1\frac{1}{2}$ to 3 grains (**0·1 to 0·2 Gm.**).

Red crystals soluble in water about 1 in 19 at 17° C., but solutions are unstable.

Lithii Formas, H.COOLi, H_2O=69·9634. White crystalline powder freely soluble in water.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). As much as $1\frac{1}{2}$ Gm. of this salt have been given daily.

Uses.—Similar to the Sodium Salt and has been given in gout.

Magnesii Formas, $Mg.(HCO_2)_2 2H_2O$=150·3668.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Colourless crystals soluble in water.

Potassii Formas, H.COOK=84·1078.

Dose and use similar to the Sodium Salt.

Crystalline powder very soluble in water forming neutral solution.

Owing to hygroscopic tendency the commercial salt is about 95% pure.

ℙ **Strychninæ Formas,** $C_{21}H_{22}N_2O_2$. HCOOH=380·2032.

Dose.—$\frac{1}{64}$ grain (**0·001 Gm.**).

White crystalline powder, soluble in water about 1 in $2\frac{1}{2}$. A nerve stimulant and muscular tonic. It is best prepared anhydrous.

℗ **Hypodermic Sterules of Strychnine Formate** contain 1/64 grain (**0·001 Gm.**) in 15 minims (**1 Cc.**).

Ⓟ**Syrupus Formatum Compositus** (*Syn.* **Elixir Formatum Compositum**).

Dose.—1 to 2 drachms (**4 to 8 Cc.**). One drachm contains Formates of Sodium and Potassium each 2 grains, Calcium 1 grain, Quinine $\frac{1}{5}$ grain, Strychnine $\frac{1}{100}$ grain, Formic Acid 2 minims, Cochineal Vanillin, Lemon Oil, Alcohol, Water and Syrup.

ACIDUM GLYCEROPHOSPHORICUM.

$C_3H_5(OH)_2O.PO.(OH)_2 = 172{\cdot}0902$.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) of 25% acid.

This dibasic acid forms a colourless liquid, miscible with water and alcohol. It is usually made 25% strength and has Sp. Gr. 1·125. It may be prepared by heating Glycerin with two-thirds of its weight of Phosphoric Acid 60%, at not exceeding 105° C.

Uses of the Glycerophosphates.—Thought to aid metabolism, hence given in emaciation and generally for tonic action. The Compound Syrup and Glycerol of Glycerophosphates, the Syrup of Glycerophosphates with Formates, and many of the Milk and Glycerophosphate preparations have tonic properties in devitalised conditions, *e.g.*, during convalescence from illness.

The Glycerophosphates were originally introduced into medicine by Robin, on the grounds that Lecithin (*q.v.*), an omnipresent, complex fatty body, contains its phosphorus in the form of the Glycerophosphoric radical.

For a further consideration of the subject, see Edn. XVIII.

Calcii Glycerophosphas (Neutral). $C_3H_7O_3.PO_3Ca = 210{\cdot}1546$ or $+H_2O = 228{\cdot}1702$, Fr. Cx., P. Belg. IV., P. Helv. and P.G. VI. have $+2\ H_2O$. U.S. X. requires 98% anhydrous salt when dried at 130° C. P. Ital. V.—On calcining should leave not less than 59·5% Calcium Pyrophosphate.

F.E. VIII. has *Syn.* Neurosina.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) or more *per os* in water, *vide infra.* Slipule No. 1 holds 5 grains. *Hypodermically* 1 grain (0·06 Gm.) in 40 minims (2·5 Cc.). *Intravenously* 1 grain (0·06 Gm.) in 100 minims (6 Cc.) is suggested by analogy with the Lactophosphate.

This salt is a white crystalline powder. It is formed, together with choline, on the breaking up of lecithin in the process of digestion.

Soluble in cold (about 1 in 40, but different maker's products vary according to whether the compound is mainly the β modification, which is less soluble than α. The α position is the terminal hydroxyl in Glycerin and the β the central in combination with Phosphoric Acid). It is only slightly soluble in hot water, soluble also in glycerin, insoluble in alcohol.

The pure α salt is soluble 1 in 22.—G. J. W. Ferrey, P.J. ii./26,159.

Uses.—Stated to improve nutrition of the nervous system in all cases where nerve activity is enfeebled. It is useful *per os*, for incontinence of urine. It may also be given hypodermically, 2 to 4 grains daily in water.

Calcium Glycerophosphate Sterules contain one grain, also 2. 3 and 4 grains.

For deficiency of Calcium in the blood bold doses are required. The soluble Phosphates have power in increasing coagulability of the blood. Severe urticaria has been cured by its use.

Incompatible with soluble Carbonates and Phosphates.

Pulvis Calcii Glycerophosphatis cum Lacte Exsiccato.

Milk and Glycerophosphate.—*Martindale.*

Dose.—One heaped tablespoonful (½ ounce), mixed with 4 to 5 ounces of hot (nearly boiling) water, two or three times daily.

This preparation is intended as a restorative and nutritive. Phosphorus and Nitrogen retention are likely to improve with its use. Has proved of value in the feeble for inducing sleep. It contains 5 grains of Calcium Glycerophosphate in the above dose combined with *all* the solids of fresh milk.

Dried Casein alone is sometimes used for preparations of this kind, but in this case the Milk Fat, Salts and Sugar are eliminated, and Dried Caseins of commerce are not always readily soluble even with added alkali.

***Vitafer** (T.M. 347470, also 324675 and 333647, Class 3; also 329754 and 334627 (assoc.) and ***Cibrola** (T.M. 319735, Class 42) are preparations of this description—the former containing the Glycerophosphates of Lime and Sodium.

Calcii Glycerophosphas Solubilis consists of the Neutral Glycerophosphate with Citric Acid added to render it soluble 1 in 25.

Ferri Glycerophosphas (FERRIC GLYCEROPHOSPHATE).

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). In yellowish powder containing approx. 15% of Iron—slightly soluble in water, or in the more soluble brownish-yellow scales.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Syl Limonis.

Vinum Ferri Glycerophosphatis contains 1%, with Glycerin 5% in Sherry. **Sterules** contain ½ grain (**0·03 Gm.**).

Ⓟ Compound Iron Glycerophosphate Capsules.

Dose.—One thrice daily after meals.

Iron Glycerophosphate, Beta Naphthol of each 3 grains, Extract of Nux Vomica and Indian Hemp of each ¼ grain, Compound Galbanum Pill 1½ grains.

For anæmic patients in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Magnesii Glycerophosphas. $C_3H_7O_3.PO_3Mg = 194·3946$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

A white amorphous powder, soluble in water (1 in 41). May be rendered soluble by addition of Citric Acid.—Umney.

We found 1% of Citric Acid increases the solubility to about 1 in 35, 5% to 1 in 25, 10% to 1 in 20. Glycerophosphoric acid added gives the figures 1 in 33, 1 in 24 and 1 in 18 respectively.

Manganesii Glycerophosphas. $C_3H_7O_3.PO_3Mn = 225·0046$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Is reddish white in colour, only slightly soluble in water.

The relative anæmia which is often associated with cardiac over-strain may well be treated by administering Manganese Glycerophosphate with Hæmoglobin.

Potassii Glycerophosphas. $C_3H_7O_3.PO_3K_2+3H_2O=302{\cdot}3214$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) ; *hypodermically* 3 to 5 grains (**0·2 to 0·3 Gm.**).

A yellowish liquid in 50 and 75% solutions and 100% (solid).

Quininæ Glycerophosphas. *Syn.* KINEURINE.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

$C_3H_7O_3.H_2PO_3.(C_{20}H_{24}N_2O_2)_2.4H_2O=892{\cdot}559$. FR. CX. has the compound with $5H_2O$, termed ' basic ' quinine glycerophosphate in France. A white powder, soluble in alcohol, but only very slightly in water. **Sterules** contain $\frac{1}{2}$ grain (**0·03 Gm.**).

Sodii Glycerophosphas.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**), *per os* ; also given *hypodermically* in 3 to 5 grain doses.

It is supplied commercially in the following forms :—

Dry Pieces or Powder 100% $C_3H_7O_3.PO_3Na_2.3H_2O=270{\cdot}1154$. Very soluble in water. Hygroscopic. **Solution** 75%, a translucent straw-coloured mass which cannot be poured without warming. **Solution** 50%, syrupy fluid convenient for dispensing.

Glycéro-phosphate de Sodium Cristallisé. FR. CX. SUPP. NOUV., 1926. Is the hydrated di-Sodium Salt of β-glycerophosphoric Acid with 5 mols. H_2O. It contains 70·6% anhydrous salt and 29·4% water. P. Ital. V., P. Belg. IV. and F.E. VIII. similar. Ph. Ned. V. has $5\frac{1}{2}H_2O$.

Sterules of Sodium Glycerophosphate contain 3 grains (**0·2 Gm.**). Also ℙ1 Sodium Glycerophosphate $1\frac{1}{2}$ grains with Strychnine Cacodylate $\frac{1}{64}$ grain and ℙ1 with $\frac{1}{20}$ grain.

Uses.—In nervous affections, facial neuralgia, Addison's disease, lumbago, phosphaturia, anæmia and general debility.

✱**Glycolactophos** (T.M. 344300, Class 42), ✱**Sanaphos** (T.M. 363457, Class 3), ✱**Sanatogen,** (335408, Class 3), and ✱**Visem** (T.M. 334359, Class 3, and 336808, Class 42), are Casein and Glycerophosphate combinations used in neurasthenia, and enfeebled nervous conditions generally. Further details are available, Edn. XVIII., p. 45.

✱The Sanatogen Co. 335407, Class 3, and Sanatogen Wulfing 316530, Class 3 are also on the Register.

ℙ1 **Strychninæ Glycerophosphas.**

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ gr. (**0·001 to 0·003 Gm.**)

White crystalline powder, soluble in water. A ' tonic.'

Confectio Glycerophosphatum Composita. *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Calcium glycerophosphate $2\frac{1}{2}$, Iron glycerophosphate 2, Sodium glycerophosphate $2\frac{1}{2}$, Lecithin $\frac{1}{2}$, Citric Acid $1\frac{1}{2}$, Glyl Anisi 12, Pepsin $1\frac{1}{2}$, Full Cream Dried Milk to 120.

This preparation has restorative, nutritive and digestive properties.

Confectio Glycerophosphatum cum Malto. *Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Contains the glycerophosphates as in the last mentioned in a basis of Malt Extract. It does not contain Pepsin.

Elixir Glycerophosphatum.

Calcium and Sodium Glycerophosphates of each 2, Iron Glycerophosphate 1, Aromatic Syrup 250. *Dose.*—1 to 4 drachms.

Ⓟ**Glycerinum Glycerophosphatum Compositum.**—*Syn.* GLYCEROLE OF GLYCEROPHOSPHATES. *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

Cudbear ¼ ounce, Water 10 ounces. Boil 10 minutes, strain, and dissolve in the warm liquor—Calcium Glycerophosphate 160 grains, Potassium, Sodium, and Magnesium Glycerophosphates of each 80 grains, Iron Glycerophosphate 40 grains, Citric Acid 30 grains; add Tincture of Kola 10 drachms, Tincture of Ignatia Amara 1 ounce, and Glycerin *q.s.* to 1 pint. This is more palatable than if made with Strychnine and Caffeine. It keeps well, is suitable for export, and for patients who may not take sugar.

Glycerinum Glycerophosphatum cum Medulla Rubra. GLYCEROLE OF GLYCEROPHOSPHATES WITH RED BONE MARROW.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Dissolve Calcium Glycerophosphate 80 grains, Iron Glycerophosphate 20 grains, Magnesium Glycerophosphate 40 grains, Manganese Glycerophosphate 20 grains, Potassium Glycerophosphate 40 grains, Sodium Glycerophosphate 40 grains, and Citric Acid 15 grains in Distilled Water 10 ounces; then filter and add Chloroform 5 minims, Alcohol (90%) 40 minims, Orange-flower Water 1 drachm, Cherry Laurel Water 1½ drachms, Glycerin Extract of Red Bone Marrow 10 ounces. Given in rickets and debility.

The writer prepares this Glycerol with four times the amount of Chloroform, *i.e.*, 1 in 480.

Granular Effervescent Glycerophosphates.

Dose.—60 grains (**4 Gm.**).

Contains in 1 drachm, Glycerophosphate of Calcium 3 grains, of Iron 1 grain, of Magnesium 3 grains, of Potassium 3 grains, with Caffeine Citrate 1 grain. A palatable mode of administration.

Malted Glycerophosphates.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Sodium Glycerophosphate 1, Potassium Glycerophosphate 1, dissolved in Water 30, with Liquid Extract of Malt to 120.

Ⓟ**Syrupus Glycerophosphatum Compositus,** B.P.C.

Dose.—1 to 2 fluid drachms (**4 to 8 Cc.**). 1 drachm contains 1/80 grain Strychnine with Calcium Glycerophosphate 1¼ grains, Potassium, Sodium and Magnesium Glycerophosphates of each ⅝ grain, Iron Glycerophosphate and Caffeine each $\frac{5}{16}$ grain—with Glycerophosphoric Acid and Cudbear (*q.v.*, Vol. II.), to colour.

This has been described as a good tonic.

Ⓟ**Capsules** are prepared equivalent to ½ and 1 drachm.

Ⓟ**Pulvis Glycerophosphatum Compositus.**

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Glycerophosphates of Calcium 2·0 Potassium (100%) 1·0, Sodium 1·0, Magnesium 1·0, Iron 0·5, Caffeine 0·5, Strychnine Hydrochloride 0·024 (use Trituration 0·24), Powdered Sugar to 100. This keeps satisfactorily in corked bottles.

Compound Glycerophosphate Tablets are prepared containing in each the same quantities as the Syrup per drachm but without strychnine. To be crushed and taken in a little warm water.

Ⓟ**Syrupus** (*Syn.* **Elixir) Glycerophosphatum cum Formatibus** (*Martindale*). Contains Sodium and Potassium Formates of each 5 grains added to each drachm of a compound Glycerophosphate Syrup (made with Acetic Acid).

Ⓟ**Syrupus Glycerophosphatum** (*Robin*) is a special preparation.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

The published formula (vide Edn. XVIII, p. 47) is impracticable.

Emulsio Olei Morrhuæ et Glycerophosphatum.

Dose.—2 to 8 drachms (**8 to 30 Cc.**).

Contains the Glycerophosphates of Calcium, Iron, Magnesium, Potassium and Sodium, combined with Cod Liver Oil Emulsion, containing 50% Cod Liver Oil. A useful nutrient combination.

✱**Jecovol** (T.M. 315237 and 318395, Class 3) is a proprietary Emulsion of Cod Liver Oil with Sodium, Calcium and Iron Glycerophosphates.

℗**Sérum Névrosthénique Ampoules** (*Fraisse*) contain 0·1 Gm. Sodium Glycerophosphate and 0·0005 Gm. Strychnine Cacodylate, for hypodermic injection. In neurasthenia and other nervous affections.

℗*Drops* are also prepared for use by the mouth, containing the above quantities in 25 minims.

Dose.—25 drops daily.

℗**Ferruginous Ampoules** (*Fraisse*) contain Iron Cacodylate 0·01 Gm. ($\frac{1}{6}$ grain), Sodium Glycerophosphate 0·1 Gm. ($1\frac{1}{2}$ grains) and Strychnine Cacodylate 0·0005 Gm. ($\frac{1}{120}$ grain) in 1 Cc.

℗*Drops* containing the above quantities in 25 minims are prepared.

Dose.—8 to 10 drops in water after food twice a day (for adults). Maximum daily dose 25 drops.

Similar Combinations, British made, are available in ampoules.

ACIDUM HYDRIODICUM.

Syn. **Acidum Hydriodicum Dilutum, U.S.**

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) in syrup.

This Acid is readily prepared by heating red phosphorus and iodine in presence of water.

A colourless, sour liquid, which becomes dark in colour on exposure to light. If this happens on keeping shake with a little dilute Hypophosphorous Acid (*B.P.* '14 contains 1% added). Sp. Gr. 1·085=about 12% of Hydrogen Iodide HI=127·9398. (*B.P.* '14 and U.S. contain 10%). Commercially it is also prepared 20% with Sp. Gr. 1·17, and 46 to 47% strength with Sp. Gr. 1·5.

Flavoring.—Syl Rosæ, Syl Origani ; Syrupus Tolutanus.

Syrupus Acidi Hydriodici (B.P. '14).

Dose.—30 to 60 minims (well diluted).

Diluted Hydriodic Acid 1 by wt., Water 0·5, Syrup to 10. Contains 1% HI. U.S. is similar, containing 1·4%.

Glycerinum Acidi Hydriodici.

Dose.—20 to 60 minims in Water, increased to three drachms.

Experiments which we have conducted show that dilute Hydriodic Acid 1, Glycerin $4\frac{1}{2}$, and Water $4\frac{1}{2}$, produce a glycerole with good keeping qualities. Contains 1% hydriodic acid.

ACIDUM HYDROBROMICUM.

HBr=80·9238.

Acidum Hydrobromicum Concentratum.

Hydrobromic Acid of Sp. Gr. 1·308=35%, colourless or straw-coloured, when diluted ; one volume with three of distilled water

produces an acid of 10% strength. Should be kept from sunlight. If of Sp. Gr. 1·260=30%; 1·375=40%; 1·450=45%. Ph. Ned. V. is 4 × N. (about 32%).

Incompatible as Acid Hydrochloricum, *q.v.*

Acidum Hydrobromicum Dilutum (*B.P.* '14); U.S. IX., Fr. Cx.

Dose.—15 to 60 minims (**1 to 4 Cc.**); 60 minims=10 grains of potassium bromide approximately. Contains 10% of hydrogen bromide. Sp. Gr. 1·077. May be prepared by the action of Phosphoric Acid on Potassium Bromide. A colourless, very sour liquid, without odour.

Uses.—To allay nervous excitability and exhaustion, as a solvent for quinine and preventing quinism 8 minims will dissolve 5 grains of quinine sulphate in water, and as an alternative for potassium bromide; given with morphine to allay after effects. Obviates the sense of fulness of the head felt when taking iron. It is useful for tinnitus aurium and tickling hackingcough in doses of 10 minims, and in headache, with flushing in the face and ringing in the ears. In vertigo it is successful and it relieves toothache. In epilepsy, up to ½ ounce well diluted may be given; even to 3 ounces daily.

'**Bon Voyage**' a specialty for **sea sickness**, of some service, contains, *inter alia*, this acid and sodium bromide.

Dose.—Half an ounce in a wineglassful of water at 6 and 3 hours before embarking, and once a day in half doses for the first two days of the voyage if required. Not to be taken on an empty stomach.

Bon Voyage Tablets are also prepared, 2 being equivalent to ½ ounce dose.

ACIDUM HYDROCHLORICUM.

HCl=36·4648.

"*Poisonous—Not to be taken.*"

For retail in Great Britain, Northern Ireland and Irish Free State, the box, bottle, vessel, wrapper, or cover in which the acid is contained must be distinctly labelled with (1) *the* **name of the substance**; (2) *the words* "**Poisonous—not to be taken**"; (3) *the* **name and address** *of the seller. Any liquid substance to which Section 5 of the Poisons and Pharmacy Act,* 1908,—*Restrictions on sale of certain Poisonous Substances—applies (to wit, Hydrochloric, Nitric and Sulphuric Acids, Soluble Salts of Oxalic Acid, Liquid preparations containing more than* 5% *by weight of free Ammonia, and all liquid preparations sold as Carbolic, etc., containing not more than* 3% *Phenols,—see Poisons Schedule), shall not be delivered except in bottles or other containers, rendered* **distinguishable by touch** *from ordinary bottles or containers.*

B.P. '14 has Sp. Gr. 1·160. Contains 31·79% by weight HCl. Ph. Ned. V. and P. Helv. 25%. Fr. Cx. and F.E. VIII. 33·65%. P.G. VI. 24·8 to 25·2%. P. Ital. V. 35·39%. P. Belg. IV. 36·47%. U.S. X. 31—33%.

Antidotes.—Alkalis, sal volatile, saccharated lime, calcium carbonate, alkaline bicarbonates, carron oil, white of egg, morphine, lime

water, magnesia, milk, soap and water. Give beef tea enema and stimulants.

Suggestions to add mineral acids and Salts of Lemon to Poisons Schedule. —H. R. Oswald, West London Coroner, B.M.J. ii./25,1020, 1033.

Incompatible with alkalis, alkaline carbonates, metallic oxides, silver and lead salts.

Use.—Escharotic.

ALIMENTARY TOXÆMIA.—BOUCHARD'S REMEDY: fuming hydrochloric acid 5 to 10 m. freshly mixed at the time of administration with 6 to 8 ounces of water and taken with every meal. Of great value—reinforces the antiseptic power of the gastric juice.—W. Armstrong, L. i./13,1384.

NEURITIS treated by applying strong Hydrochloric Acid to the skin along the line of the inflamed and painful nerve on a wad of cotton wool. Results striking and appreciated (H. Wingfield's treatment).—H. Sainsbury, L. i./17, 911. The treatment was described 20 years ago. It was discovered accidentally. R. A. Bayliss reported cases successfully treated.—L. ii./17,57.

Hydrochloric Acid, arsenic-free, may be made by warming with pure fine copper gauze, and then distilling.

Acidum Hydrochloricum Dilutum (*B.P.* '14).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Is prepared by diluting 28·44 by vol. of the strong acid with water to 100. Sp. Gr. 1·048. Contains, *B.P.* '14 U.S., P. HELV., F.E. VIII and F. NORSK, 10% HCl by weight. P. Ital. V. 8·07%, PH. NED. V. is 4 × N (14·5%), P.G. VI. 12·4 to 12·6%, P. Belg. IV. 7·29%.

Sp. Gr. and % Tables.—See Vol. II.

Use.—Tonic biliary stimulant. In dyspepsia, where insufficiency of acid. In pernicious anæmia strong Hydrochloric Acid 10 to 15 drops given in mucilage has been found useful. Gargle 1 in 50 to 1 in 100 for sore throat. When diluted forms a useful refrigerant drink and lotion.

In dilatation of the stomach 10 to 15 minims after each meal may be given with or without 6 to 8 grains of Pepsin.

RHEUMATOID ARTHRITIS.—It is often associated with some focus of pyogenic infection,—*e.g.*, oral sepsis. The following is of use: An acid mixture containing Dilute Hydrochloric Acid 5 minims, Glycerol of Pepsin 20 minims, Clove Oil 1 minim, Tincture of Quillaia 20 minims, Aniseed Water to ½ oz. *Dose*—thrice daily. Cases benefited.—A. S. Woodwark and R. L. MacKenzie Wallis.—L. ii./12,943.

The regulation of the alkaline balance of the blood, and through it of the tissue fluids, is one of the most important functions of the kidneys. Treatment with Hydrochloric Acid largely regulates the amount and character of the urine excreted by its action on the renal tissue. Where acid is being administered in doubtful cases the blood pressure should always be observed to avoid overdose.—J. Campbell McClure and H. A. Ellis, L. ii./21,271.

RICKETS treated with Hydrochloric Acid.—B.M.J.E. i./24,69.

SPASMOPHILIA (INFANTILE TETANY).—Hydrochloric Acid (*e.g.*, 260 Cc. of N/10 Acid with 750 Cc. Milk) efficacious, but effect only transient.—Dan T. Davies, L. i./30,202.

The role of Hydrochloric Acid in the causation of gastric pain. Concentrations of 0·5% or even less will reproduce typical gastric pain in susceptible individuals suffering from painful disturbances of gastric function. Hydrochloric Acid plays no essential part in ordinary pain production.—T. L. Hardy, L. i./29,711.

***Oxyntin** (T.M. 274899). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

An Albumin-Hydrochloric Acid compound. Contains 5% by weight of Hydrochloric Acid (HCl). Ten grains are equivalent to 5 minims of Dilute Hydrochloric Acid, instead of which it may be prescribed.

Given in gastric disorders to increase HCl content.—B.M.J. i./15,807.

Acidin.—*Dose.*—5 to 15 grains (**0·3 to 1 Gm.**), equivalent to 2½ to 7½ minims of Dilute Hydrochloric Acid (B.P. '14), in cachet or powder, followed by a draught of water.

A protein compound containing 5% Hydrochloric Acid, soluble in water. Useful for liberation of acid in a nascent condition as digestive.

Acidin Pepsin Tablets, made each=5 minims Dilute Hydrochloric Acid and 3 grains Pepsin.

Dose.—1 or 2 as required after meals.

An investigation into the value of Pepsin and Hydrochloric Acid in a chlorhydria showed that a proper concentration of free Hydrochloric Acid seemed to be the primary consideration in gastric secretion.—H. V. Dobson, Jl. Ph. and Exp. Ther., Apl. '27,447.

ACIDUM HYDROCYANICUM.

Prussic Acid (Scheele's Strength).

℗1 *Prussic Acid and all preparations or admixtures containing 0·1 or more % of Prussic Acid* (i.e., *Hydrogen Cyanide*), e.g., *Aqua Laurocerasi, q.v.*

Applicable to Northern Ireland as above and in respect of Irish Free State "Prussic Acid" only.

℗ *All preparations or admixtures containing less than 0·1% Prussic Acid* (*Hydrogen Cyanide intended*).

Manufactured by distillation of Potassium Ferrocyanide with dilute Sulphuric Acid.

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

A colourless liquid with powerful odour. Sp. Gr. 0·994. Contains 4% HCN=27·0158.

Antidotes.—Emetics immediately, stomach tube, brandy, or ether, fresh air, inhaling ammonia, artificial respiration (20 per minute). $\frac{1}{30}$ grain atropine hypodermically. Hydrogen Peroxide and Chlorine Water have been given.

Dissolve about 15 grains of Ferrous Sulphate and about 20 minims of Tincture (or Solution) of Ferric Chloride in a wineglassful of water, then add 1 to 2 drachms of Magnesium Carbonate, previously made into a thin cream with water. Mix and give and repeat *s.o.s.* These quantities are equivalent to about 100 minims of Dilute Hydrocyanic Acid, B.P.—St. Bart.'s H.

50 to 70 Cc. of a 20% Sodium Thiosulphate solution intravenously should be tried. A case where life was saved.—B.M.J. i./25,1158.

Two intravenous injections of Sodium Thiosulphate, using 10 Cc. of a 30% solution, of use in a case of Potassium Cyanide poisoning.—Pres., July, '27,256.

Poisoning of a laboratory assistant who inhaled fumes from HCN lying in a concentrated sludge in a sink which escaped on stirring.—B.M.J. i./30,132.

Hydrocyanic Acid poisoning. Effects of being gassed.—J. R. Graham, B.M.J. i./30,262.

Thiocyanate formation the primary factor in Cyanide poisoning.—R. G. Smith and R. L. Malcolm, Jl. Pharm. & Exp. Therap., Dec., '30,471.

Hydrocyanic Acid for killing rats in ships no serious risks to foodstuffs.—G. W. Monier Williams, B.M.J. i./31,65.

℗1 **Acidum Hydrocyanicum Dilutum** (*B.P.* '14), U.S. IX., Ph. Ned., P. Belg. IV., Fr. Cx. (previously 1% only). *Syn.* Dilute Prussic Acid.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). Fr. Cx.—Max. single dose 1½ minims (**0·1 Gm.**); Max. during 24 hours 8 minims (**0·5 Gm.**).

Contains 2% HCN, Sp. Gr. 0·997. F.I. 1925 no longer recognises this acid. Keep in inverted stoppered bottles in the dark.

For the estimation of Hydrocyanic Acid and detection of minute amounts in Toxicological work, see Vol. II.

Flavoring.—Glyl Lavandulæ, Glyl Menthæ Piperitæ ; Spiritus Menthæ Piperitæ ; Syrupus Zingiberis.

Incompatible with soluble silver, mercury and iron salts.

Uses.—In dyspepsia with pain, combined with Bismuth or Sodium Bicarbonate. To allay vomiting and cough. It is very useful as a sedative in an effervescing mixture.

To promote healing of acute gastric ulcer bismuth, according to some, is of no particular value, but dilute hydrocyanic acid 5 minims in two drachms of water is useful for vomiting.

℗Lotio Acidi Hydrocyanici cum Sodio, L.H.

Diluted Hydrocyanic Acid 4 minims, Borax 4 grains, Sodium Bicarbonate 4 grains, Water to 1 ounce. As a soothing eye lotion.—**R.O.H.** has 1% approx. of each.

ACIDUM HYPOCHLOROSUM.

HClO=52·4648.

Hypochlorous Acid, as such, has not been isolated. In solution and especially in the form of its salts—the Hypochlorites, *e.g.* those of Calcium and Sodium, it has played an important part in many chemical processes. The method of treating Chloride of Lime with Boric Acid in excess, as advocated during the war, was recognised in the past as a method of making solutions of Hypochlorous Acid.

The acid in dilute solution is practically colourless ; in a concentrated form it is yellowish. It readily undergoes decomposition with formation of chlorine, chloric acid, oxygen and water. It is hence a strong oxidising agent and for this reason a bleaching agent.

Medicinally the Chlorinated Soda Solution was a popular detergent during the last half century, but has latterly fallen into desuetude. The Hypochlorites were, however, resuscitated and were extensively employed for wound treatment in the war as described in the following pages.

Calx Chlorinata (*B.P.* '14). Sel de Javelle. A dull white powder having about 30% available Chlorine. Solutions of 0·25 to 0·5% applied to burns and ulcers heal them rapidly.

25,000 gallons of water can be sterilised for less than 1d. by aid of Calx Chlorinata.—Thresh.

'Tropical' Bleaching Powder is available, which is remarkably stable even in hot climates.—L. i./29,696.

Chlorination of Potable Water. 1 ounce of Chloride of Lime to 2,000 gallons. Remove taste by a few crystals of Sodium Hyposulphite.—Ministry of Health Circular, L. ii./21,671. *cf.* also Vol. II.

Swimming Pools.—From 1 to 1½ lbs. per 100,000 gallons of water used in America.—P.J .ii./28,196.

Liquor Calcis Chlorinatæ (*B.P.* '14). 10%. Contains not less than 2% available Chlorine, 3% when freshly made.

Unguentum Calcis Chlorinatæ.

Chilblains can be cured with 10% strength in Paraffin Ointment.

Gonococcal arthritis in women has been treated by vaginal douching twice daily with solution of calx chlorinata 1 in 100. Afterwards a solution of Hydrogen Peroxide is freely used.

Phthisical sufferers advised to work at bleaching powder factories. Interesting data concerning Chlorine and Nitric Peroxide fumes.—T. Aitchison, B.M.J. ii./15,489.

Liquor Sodæ Chlorinatæ (*B.P.* '14). 2·5% Cl. *Dose.*—10 to 20 minims. Dissolve Sodium Carbonate 600 in Water 1,000. Triturate Chlorinated Lime 400, with Water 3,000. Mix, and filter.

Should be freshly made. Other Pharmacopœias use more Sodium Carbonate to obtain a preparation which will keep better.

The reaction may be represented as follows :—

$$CaOCl_2 + Na_2CO_3 = NaClO + NaCl + CaCO_3.$$

The quantity of Sodium Carbonate in B.P. '14 method is not enough to precipitate all the dissolved Calcium Hydroxide, and if sufficiency is used the preparation is excessively alkaline. R. C. Cowley modifies the formula.—C.D. 1919, 91, 49, abst. Y.B.P. 1919, 280.

Carefully distinguish from Liquor Sodæ Chlorinatæ Chirurgicalis, U.S. X. our p. 45.

Uses.—As a wound lotion and for general antiseptic purposes; for infected wounds or ulcers. It is usually employed diluted with 15 to 60 times its volume of water or normal saline. Thus diluted it has been used as a vaginal douche and as an irrigant of the bladder, and mouth wash. Locally in skin affections, however, a 10 to 30% dilution is suitable.

It is strongly alkaline and may well be treated with Boric Acid. (*cf.* Dakin's Solution.)

Eau de Labarraque or **Liqueur de Labarraque.**—Fr. Cx., is about $\frac{1}{4}$ the strength of Liquor Sodæ Chlorinatæ (*B.P.* '14). U.S. X., gives Eau de Labarraque as a synonym for Liquor Sodæ Chlorinatæ—the strong preparation containing 2·5% available Chlorine. Initially Labarraque made his bleaching solution by passing Chlorine into Sodium Carbonate Solution. In this case free Hypochlorous Acid is present :

$$Na_2CO_3 + 4Cl + H_2O = 2HClO + 2NaCl + CO_2.$$

Eau de Javelle (first made in 1789) was originally a solution of Chlorinated Potash made with Potassium Carbonate on the same lines as Chlorinated Soda Solution, but it is now replaced in great measure by the Soda Compound.

For carbuncles Liquor Sodæ Chlorinatæ, diluted 1 in 20 or 1 in 30, is a non-irritant and powerful dressing.—S. Phillips, L. i./21,63.

Liquor Acidi Hypochlorosi Compositus. *Syn.* **Eusol.**—(Lorrain Smith, Drennan, Rettie & Campbell.—B.M.J. ii./15,129).

This solution contains approximately 0·27% Hypochlorous Acid, with small amounts of Calcium Biborate and Calcium Chloride.

The solution is slightly alkaline to test paper.

Manufacture.—Take Bleaching Powder 12·5 (of recent preparation and which has not been allowed to get wet), and Tap Water 1,000. Triturate thoroughly with enough of the water to make a paste and dilute with the remainder. Add Powdered Boric Acid 12·5 and shake well. Allow to stand for two or three hours and filter through cloth or paper. Eupad 25 may be used instead of the two ingredients. The interaction according to the originators may be represented by the following :—

$$2CaOCl_2 + 2H_3BO_3 = 2HClO + CaB_2O_4 + CaCl_2 + 2H_2O.$$

It is to be noted that only *half* the 'available' chlorine (as determined in an assay) is liberated as Hypochlorous Acid, the available Chlorine from $2CaOCl_2$ being 4Cl.

The two powders may conveniently be packed separately ready weighed for use sufficient to make 1 or 2 or 5 litres, for purposes of transit—the chlorinated lime in waxed paper (*cf.* L. i./16,32).

For Details of Preservation, Assay and Bactericidal Power, see Vol. II.

Uses.—Eusol may be employed as a lotion or on gauze wrung out and applied without waterproof; or as a bath full strength or diluted. The object is to secure the maximum effect with minimum irritation. As a lotion it should be used *warm.*

In presence of blood or any considerable amount of organic matter Eusol is worthless.—L. P. Garrod, B.M.J. i./31,574. We cannot reconcile this statement with undoubted clinical data of value.—W.H.M.

Although solutions of Alkaline Hypochlorites have been used for many years, solutions of the acid have not been generally employed. Chlorine water probably owes its antiseptic power to the presence of this acid. Lister found the Liquor Chlori of the old B.P. effective when a 1 in 5 solution of Phenol had failed (1870).

Eusol was the result of an investigation at the Royal Infirmary, Edinburgh, to prepare an antiseptic which could be applied as a first dressing in the field to prevent sepsis. It has no harmful effect upon the tissues, the effect being purely local. Flow of lymph is induced by it from the tissues. It removes offensive odour in a wound. For field use the antiseptic may also be employed in the form of dry powder (Eupad) if water is not available—*vide* Eupad.

The authors of the original communication used the solution in out-patient cases—injuries to the head or hands, lacerated, contused or incised, many being septic. Septic cases were clean in 1 to 3 days, while Boric Acid soaks conducted as control required 4 to 6 days. In clean injuries it had about the same effect as Iodine, but produced less smarting.

In mastoid operations and in cases of cerebellar abscesses the use of the solution was encouraging, also as a douche in maternity cases and in cystitis, for treatment of ulcers of the leg, gangrene of the feet, pyorrhœa alveolaris and follicular tonsillitis. In a wound superficial bleaching may occur and with some irritation. If pain is produced, the application is to be diluted with saline. The above notes refer to the undiluted preparation. The solution combines a hypertonising effect with its antiseptic action.

It must not be applied for long periods to wounds of the back of the hand, dorsum of foot and of the neck, forearm and wrist. In general it should be applied once or exceptionally twice daily and *should not be covered by protective.* It should be freshly made. The drip method is useful in compound fractures, and in lacerated wounds of the limbs where there is gas gangrene and foul smelling sores. It need not be continued after the wound is fairly clean and free from smell. A sterile dressing is then sufficient.—A. Don, B.M.J. i./16,648.

Varicose ulcer, carcinoma of rectum (operation), lacerated wounds (results of accidents), severe burns, cystitis (1 in 8 irrigation), tuberculous periostitis with abscess and ulceration, tuberculous arthritis of knee (sinus), hydatid cyst (douche with 2 pints half strength), septic cellulitis, tuberculous osteomyelitis, necrosis of lower jaw for 6 months, tuberculous hip joint (amputation through joint), acute suppurative appendicitis (syringe and soak half strength), acute streptococcic infection of thumb, epithelioma of neck, tuberculous empyema, gonorrhœal discharge (burning pain at first on injection—1 in 5—but decreased as discharge lessened and finally stopped in 5 days), tuberculous otitis media, tonsillectomy (sprayed)—were amongst 99 civil cases reported by the Medical Research Committee in which Eusol and Eupad were successfully used.

Intravenous Injection was tried in septicæmia and in malignant endocarditis with pneumonia, also in acute toxæmia secondary to gas gangrene.

Eusol Sterules 50 Cc. are prepared. *References.—See* Edn. XIX., p. 48.

Eupad. Pulvis Calcis Chlorinatæ et Acidi Borici.

(Lorrain Smith and co-workers, B.M.J. ii./15,129.)

Mix intimately equal weights of finely ground Bleaching Powder (dry) and powdered Boric Acid. Should be kept in stoppered bottles and not exposed to the light; in preference mix freshly.

Caution. The evolution of Chlorinated vapour in mixing the ingredients is sufficient to "gas" the unwary

Strength.—Using Bleaching Powder *B.P.* '14 strength, this powder contains 15% available Chlorine or 11% approx. of Hypochlorous Acid.

Uses.—Was employed as a dry dressing to wounds during the war. It evolves Hypochlorous Acid rapidly when moistened between layers of gauze or lint (as in the pad of a first field dressing), and covered with wool and a bandage. When applied covered with waterproof it should be used for a short time only—10 to 15 minutes as a rule. If it causes pain a weaker application is indicated. 1 to 2 Gm. is suitable in the first field dressing.

Pulvis Calcis Chlorinatæ et Acidi Borici Mitis. *Syn.* **"Kepad."** —*Martindale.*

Chlorinated Lime 1, Boric Acid in fine powder $9\frac{1}{2}$, Kieselguhr (sterilised) $9\frac{1}{2}$ (*i.e.*, 5% Chlorinated Lime).

Eupad was found to be irritating. This preparation ($\frac{1}{10}$ its strength) is suggested as a dusting powder on septic sores.

Preservation.—Should be kept in stoppered bottles. The sterile Kieselguhr and Boric Acid may be kept mixed and the Chlorinated Lime added. Kepad containing stronger proportions of Chlorinated Lime may be prescribed, *e.g.*, 10, 20, 30%, etc. Smaller proportions—1, 2%, etc.—of Chlorinated Lime may also be used—the ratio of Boric Acid and Kieselguhr being kept the same, *viz.*, equal amounts. Kieselguhr commends itself as diluent on account of its light physical character and absorbent properties.—B.M.J. ii./16,147.

Dakin's (Stronger) Hypochlorite Solution.

The following method we find best in making large quantities:—

Rub Chlorinated Lime 150 into a smooth paste with 100 of water and add gradually, with stirring, Sodium Carbonate (Cryst.+$10H_2O$) 285, previously dissolved in water 900.

Allow to deposit, filter and titrate 20 Cc. of the filtrate with Boric Acid solution (31 Gm. per litre) using phenolphthalein suspended in water as indicator to ascertain the amount of boric acid to be added to the bulk. An excess is to be avoided; it is best to add slightly *less* than the calculated amount. Alcoholic solution of phenolphthalein cannot be used as the alcohol is at once attacked. The titration must be done fairly rapidly. The amount of Boric Acid to be added is generally about 2% of the volume.

Strength.—This concentrated solution contains about 4% of sodium hypochlorite and is ***to be diluted with 6 parts of water for use.*** It can be kept for a month without serious decomposition.

Contains small amounts of free hypochlorous and boric acids and a balanced mixture of the hypochlorites and polyborates of Sodium. Owing to the presence of these buffer salts the solution maintains approximate neutrality under most conditions, so that the irritating action of free alkali is avoided.

Dakin's (Weaker) Hypochlorite Solution.

Syn. Solutio Dakin K.C.H.

Rub Chlorinated Lime (of good quality) 200 Gm. to a smooth paste with a little water and dilute with water *q.s.* to 5 litres. Dissolve Sodium Carbonate (Cryst. + $10H_2O$) 400 Gm. in a further quantity of 5 litres of water and add to the Chlorinated Lime suspension with thorough stirring or shaking.

After $\frac{1}{2}$ hour the clear liquid is syphoned off and filtered through cotton wool. Boric Acid 40 Gm. is added to the clear filtrate (not before filtering). The solution should not be kept longer than 1 week. It contains approx. 0·5% available Chlorine.

Solutio Hypochloritis Sodii ex Dakin. *Syn.* **Solución de hipoclorito de sodio, de Dakin,** F.E. VIII. is prepared by the interaction of Bleaching Powder and Exsiccated Sodium Phosphate. The quantities to be employed are stated according to the available Chlorine in the Bleach. The Solution contains 0·45 to 0·5% available Chlorine.

P. Off.—Quantities of Chlorinated Lime, Sodium Carbonate, and Boric Acid required for varying percentages of Chlorine in the bleaching powder. Work done for the B.P. Commission.—H. Davis, P.J. ii./31,82.

For a comparison of strengths of Dakin's Solutions with Liquor Sodæ Chlorinatæ (B.P. '14), as also Bactericidal Power, see Vol. II.

Uses.—A non-irritating antiseptic for wounds. Fresh quantities should be brought in contact frequently.

The solution assists in the dissolution of necrosed tissue, this being doubtless due to the ability of hypochlorites to attack the NH groups present in proteins, forming soluble chloramines—*cf. Chloramine-'T.' Vol. II.*

Liquor Sodæ Chlorinatæ (*B.P.* '14), owing to hydrolysis, gives rise to alkalinity, which increases with dilution:

$$NaClO + H_2O = NaOH + HClO$$

hence the Boric Acid was added with a view to neutralising the caustic alkali as formed.

The solution was first used by *Carrel's Method* (B.M.J. ii./15,318), rubber tubes with holes throughout their length about 1 Cm. apart. Pieces of gauze are placed round and between the tubes and the solution runs into the wound and irrigates it. Soft Paraffin is smeared on the surrounding skin. Cicatrisation is not delayed even by continuous use.

N.B.—Not to be injected intravenously.

Sloughing and dead and decomposed material quickly disappear. There must be no impermeable material outside the gauze. *Refs. to results in the war.* See Edn. XIX., p. 50.

Clockwork-controlled Douche irrigates the wound satisfactorily.—C. W. Cathcart, B.M.J. ii./25,933.

EMPYEMA.—Irrigation with Dakin's Solution.—L. ii./30,737.

BACILLARY DYSENTERY.—Colon lavage of value.—H. Jocelyn Smyly, Tr. Roy. Soc. Trop. Med., June, 30,48.

Electrolytic manufacture of Dakin's Solution. British hospital ships were equipped with electrolysers.—P.J. i./29,15,29.

Daufresne's Modified Dakin's Solution.

Chlorinated Lime 200 Gm. is shaken vigorously with 5 litres of water and left in contact for 6 to 12 hours. Sodium Carbonate (Dry) 100 Gm. and Sodium Bicarbonate 80 Gm. are dissolved in a further 5 litres. This solution is poured into the Chlorinated Lime Solution, the mixture well shaken and filtered.

The solution should contain between 0·45% and 0·5% Sodium Hypochlorite. Its use is particularly satisfactory if employed in the first 24 hours after the infliction of the wound. 75% of the deaths from wounds in war, it was stated, after the first 24 hours, were due to sepsis.—Sherman on Carrel's Sterilisation method.—L.ii./16,800.

Liquor Sodæ Chlorinatæ Chirurgicalis, U.S.X., *Syn.* MODIFIED DAKIN'S SOLUTION, contains 0·45 to 0·5% NaOCl equivalent to 0·43 to 0·48% available Chlorine. Preferably to be kept not longer than 7 days. Made with varying quantities of Bleaching Powder and Sodium Phosphate according to the strength of the former.

Magnesium Hypochlorite is well tolerated by the tissues. Less caustic than the sodium compound. It has less antiseptic power, but twice as much can be used.

To prepare, mix Magnesium Sulphate 190 Gm. in 2 litres of water and interact with Chlorinated Lime 100 Gm. dissolved in the same amount of water and filter out the Calcium Sulphate.—B.M.J.E. i./16,16.

* **"Milton" Disinfectant** (T.M. 375959, B. 409835, 381,513, Class 2, and 382491, Class 3, and 382490, Class 1, and 382492 Class 47). This antiseptic contains Sodium Hypochlorite 1·01% with Sodium Chloride 16·8% and small quantities of Chlorate, Sulphate and

Carbonate, and Calcium Chloride. It is made by electrolysing Sodium Chloride resulting in the production of a stable form of Hypochlorite with only Sodium as a base. (Chas. Watt discovered an electrolytic process of making Hypochlorous Acid in 1859, since when there have been 'scores' of electrolytic processes advanced.—B.M.J.ii./15,809.) A deodoriser, preservative, insecticide and general antiseptic. It is stated to be harmless to the human system either internally or externally.

It is used for wounds and skin affections, either full strength or diluted down to 1 in 50 or more. For abscesses, fistulas, etc., it can be used undiluted. For the vagina and cervix 1 in 4.

For packing the vagina, gauze soaked in a 1 in 10 to 1 in 30 dilution. The pack changed every 12 hours for several days prior to operation.—W. Blair Bell, L. i./20,997.

In gonorrhœa of the female, prior to childbirth, a tablespoonful to the pint, as a vaginal douche, and half-tablespoonful to the pint for bladder and urethral irrigations in cases of urethritis.—C. W. Rundle, L. i./20,1268.

Pueperal sepsis. Advised, in cases where it is known at the time of labour that the uterine cavity has probably been infected by intrauterine manipulating.—Victor Bonney, B.M.J. i./20,266. Employ a 1 in 10 dilution for the first irrigation and later 1 in 30.—W. Blair Bell, B.M.J. i./21,695.

Has been found useful for syringing out antrum suppuration and for pyorrhœa and other suppuration in the mouth.

Dentures may be cleaned with it by the use of 10 *to* 20 *drops—not more—in a tumbler* of cold water overnight.

Antiseptic action of Sodium Hypochlorite solution, it is suggested, is not chemical, but due to rays similar to ultra-violet emitted by solution.—Comptes Rend., '25,180,1615, per Pres., Jan., '26/6.

✱**Chlor-San** (T.M. 384803, Class 3, and 384802, Class 2). A solution of Sodium Hypochlorite in salt, containing 1% available Chlorine. A household antiseptic.

Chloramine-'T.' *Syn.* Chlorazene, or *p*-Toluene Sodium Sulpho-Chloramide. Chloramina U.S.X., with 11·5 to 13% active chlorine, Mianin P.G. VI., P. Belg. IV., F.E. VIII.

$$CH_3.C_6.H_4SO_2.N.Cl.Na+3H_2O=281·6226.$$

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**) has been given with charcoal.

Manufacture.—*p*-Toluene Sulphonamide is made by acting on *p*-Toluene Sulphone Chloride (a by-product in making Saccharin) with Ammonium Carbonate. The sulphonamide (1 mol.) is dissolved in 5% cold alkaline solution of Sodium Hypochlorite (1·2 mol.), warming gently if necessary, filtering and adding 1½ volumes of saturated brine. Chloramine-'T' crystallises out, is filtered off, washed with brine and dried in the air.

It was originally made by Chattaway.—J.C.S.T.,87, p. 153 (1905).

For the theory appertaining to use of Chloramine-'T' and its Bactericidal Power, see Vol. II.

Solubility.—In water about 1 in 7, 1 in 7 of glycerin and 1 in 12 of alcohol—by our experiments, but organic solvents are undesirable. The aqueous solution is faintly alkaline and has a bitter taste. It is insoluble in Liquid Paraffin.

Incompatible.—Alcohol and Hydrogen Peroxide and many other substances. Should not be mixed with other antiseptics.

Uses.—For treatment of infected wounds and as a general surgical antiseptic, mouthwash, vaginal douche and for urethral irrigation. It is non-irritant and practically non-toxic; does not coagulate blood serum. Not suitable for intravenous use—has

marked hæmolytic action. 2% is used for infected wounds—increased to 4%. Mouth-wash, nasal or vaginal douche or for urethral irrigation, 0·25 to 2%.

Vaginal douche of 0·05 to 1% Chloramine, either as preliminary to operation, or for disinfection of discharges during pregnancy.—B.M.J.E. ii./25,8.

To sterilise water 1 in 250,000 of Chloramine-'T' is effective if a little Citric Acid (0·8 Gm. per litre) be added—the resulting water is not unpleasant to taste.—B.M.J. i./17,682. *cf.* Halazone.

Bilharzia-infected water treated with Chloramine.—H. S. Blackmore, per Jl. Roy. Soc. Trop. Med., Nov. 25,'28,297.

In aqueous solution it is fatal in 10 minutes to the following organisms at the stated dilutions: *Streptococci*, 1 : 34,000; *B. Coli* 1 : 18,000; *B. Diphtheriæ*, 1 : 30,000; *Pneumococcus*, 1 : 22,000; *B. Dysenteriæ*, 1 : 22,000; *B. Typhosus*, 1 : 20,000; *Staphylococci*, 1 : 16,000.

Chloramine-'T.' Tablets 8·75 grains. Two in 2 ounces of water =2%. Tablets 43·75 grains. One in ten ounces water = 1%. Two tablets = 2%.

Chloramine-'T' Gauze, 5 and 35% strength is made.—The former for general use; the latter as preliminary dressing of a wound.

Use *dry* and subsequently moisten if necessary when in position.

Will effect growth of healthy granulation tissue.—Lord Moynihan.

Chloramine-'T' Ointment—Chloramine-'T' 10, Sodium Stearate 86, Water 4. As a dressing to a wound after it has become superficial and is healthily granulating. The content may be increased to 12% or reduced to 6%. A 1% *Cream* is used.

Mouth and jaw wounds treated with 2% solution. Non-irritant. Results in seven cases good.—A. R. Fisher, B.M.J. i./16,87.

Bactericidal power of Chloramine and Hypochlorites in presence of serum is comparatively weak (*cf.* Flavine) and they interfere with phagocytosis.—C. H. Browning and Colleagues, B.M.J. i./17,76.

Chloramines are powerful irritants. Experimental study of effects on animals.—B. Fanlus & M. I. Smith, Jl. Pharm. and Exp. Therap., Nov., 1919.

Di-Chloramine - 'T.' *Syn.* Toluene - Sulphodichloramide, Dichloramina U.S. X., F.E. VIII. $CH_3C_6H_4.SO_2.NCl_2$= 239·0366.

This substance (insoluble in water) enables an oily solution to be prepared, the corresponding monochloride being insoluble in oils.

Manufacture.—Shake thoroughly Chlorinated Lime 350 to 400 Gm. in water 2 litres for one hour and allow to deposit. Syphon off the clear liquor and filter off the remainder. Add Toluene-*p*-sulphonamide 75 Gm. to the liquor and shake to dissolve. Filter if necessary. Acidify in a separator with Acetic Acid 100 Cc. added in portions and extract the Dichloramine with Chloroform about 100 Cc. Dry the Chloroform layer after removal, with Calcium Chloride and allow to evaporate in the air. Recrystallise if necessary.—Chattaway (J.C.S.T. 1905, Vol. lxxxvii., p. 145).

Dichloramine-'T' Solution in Chlorinated Eucalyptol-Paraffin.

Dissolve Dichloramine - 'T' 2, in Chlorinated Eucalyptol 20, without heating, and add Chlorinated Paraffin 80.

The solution is not to be used when a precipitate appears.—E. K. Dunham and H. D. Dakin, Med. Res. Com., B.M.J. i./17,265,865.

Chlorinated Eucalyptol.

Treat Eucalyptol 100 Cc. with Potassium Chlorate 3 Gm. and Hydrochloric Acid (conc.) 10 Cc. for 12 hours or longer. Then wash with water and with Sodium Carbonate solution. Remove the water, add Sodium Carbonate 3 Gm., and allow to stand 24 hours. Filter and dry with a little Calcium Chloride.

Chlorinated Paraffin.

Employ Liquid Paraffin 100 Cc. with Potassium Chlorate and Hydrochloric Acid as above, exposing the mixture to the light, preferably sunlight, several

hours. Wash with water, then Sodium Carbonate, then water again. Remov the oil, add a little Calcium Chloride and about 1 Gm. of Animal Charcoal Shake and filter.

Russian Oils, containing much **Naphthenes**, are not so suitable as American (Pennsylvanian) Oils, which contain considerable quantities of **Olefines** as well *cf.* Paraffinum Liquidum.

Uses.—For disinfecting the naso-pharynx in treatment of meningococcus carriers.

Wounds treated by spray and covered with gauze. Dress again every 24 hours; saves pain, as it is easily removed. Eliminates the Carrel tube.—J. E. Sweet, B.M.J. ii./17,249. See also J. T. Morrison and co-workers L. ii./18,230.

This Eucalyptol and Liquid Paraffin method is now superseded by the use of Paraffin Wax :—

Chlorcosane. *Syn.* CHLORCOSANE SOLVENT, PARAFFINUM CHLORINATUM, U.S.X. A chlorinated paraffin wax in the form of a light yellow oil slightly heavier than water, without odour and bland in use as a nasal spray or when placed on wounds. Employed chiefly as solvent of Dichloramine-'T.'

Manufacture.—Hard Paraffin of melting point 50° C. or higher is heated to about 120° C. and chlorinated. The temperature while the gas is being quickly passed into it should be kept within 125—140° C. Continue until the paraffin has increased in weight 45 or 55%. Hydrochloric Acid is evolved. The oil while still warm is then shaken vigorously with 5% of its weight of dry sodium carbonate and filtered.

To prepare a solution of Dichloramine - 'T' (of which it will dissolve 8·5 to 10%, 7·5 to 8% is strong enough), a portion of the oil, *e.g.*, a quarter, is heated to 75 or 80° C. and the Dichloramine - 'T' added, when dissolved add remainder of the Chlorcosane. This solution is employed for nasal irrigation and for wounds.

Carbon Tetrachloride 10% may be added to make the solution more fluid for spraying—H. D. Dakin and E. K. Dunham, B.M.J. i,/18,51.

***p*-Sulphondichloramino-benzoic Acid.** $Cl_2NO_2SC_6H_4.COOH$= 270·021. **Halazone.**

Manufacture, Notes on. *See Edn. XVIII, p.* 63.

When used to sterilise ordinarily contaminated water in 30 minutes, 1 in 300,000 is sufficient.

Soluble sparingly in water, insoluble in chloroform and petroleum. Soluble also in excess of cold Sodium Hydroxide solution, but with less quantity or with feebly alkaline salts, *e.g.*, phosphates or borates, hydrolysis occurs.

Tablets.—To prepare, powder the Sulphondichloramino-acid 4, with dry Sodium Chloride 92 and add dried Sodium Carbonate 4 (or dried Borax 8%) Pass through a No. 40 sieve (no lubricant required or indeed is to be used). and compress into tablets weighing 100 mgr.

Each tablet so made contains 4 mgr. of the Disinfectant—sufficient for a litre or a quart of heavily contaminated water.—H. D. Dakin and E. K. Dunham, B.M.J. i./17,682.

ACIDUM LACTICUM.

(B.P. '14) and numerous Pharmacopœias.

$CH_3.CHOH.COOH$=90·0478.

Dose.—15 to 30 minims (1 to 2 Cc.), well diluted. U.S. *average dose* 30 minims.

A colourless, odourless, syrupy, sour liquid, obtained by the fermentation of milk sugar by the action of *Bacillus acidi lactici.* Lime

or Zinc Oxide is used to neutralise the acid as formed. The respective lactates are then decomposed. It has Sp. Gr. 1·21 and contains not less than 75% by weight of hydrogen lactate and not less than 10% by weight of lactide $C_6H_8O_4$. Fr. Cx. has Sp. Gr. 1·24 at 15° C.

Solubility.—Is miscible with water, alcohol, and ether; it coagulates milk and albumin.

Uses.—It has been used locally in tuberculous ulceration of the pharynx and larynx, in diphtheria, &c., and internally for infantile and tropical diarrhœa, dyspepsia, and to allay cough in phthisis, and as a stomachic tonic in combination with iron and lime, and in vesical catarrh. As a paint, or paste with kaolin, or as a 50% injection, has been used in lupus, but is painful.

Chronic Enteritis treated with Lactic Acid 7½ minim doses *t.d.s.p.c.*, the rationale being that *B. Coli*, which is, as a rule, universally active in those cases where the motions are unduly offensive, cannot grow in a concentration of Lactic Acid of more than 1%.—I. H. Lloyd-Williams, B.M.J. i./23,1053.

Infants over 3 months in which attempts to give an adequate quantity of food have been attended by signs of intolerance frequently thrive on milk to which has been added Lactic Acid B.P. 1 drachm to the pint. The milk should be boiled for two minutes, allowed to cool, and must be beaten or shaken up while the acid is added slowly drop by drop. The culturing of the Lactic Acid Bacillus in the milk has also been of great value in certain types of cases.—B.M.J. ii./27,1173.

Lactic Acid Milk Gt. Orm. H. is similar.

Test for in vomit, &c., vide 'Examination of Stomach Contents, Vol. II.

Butyric Acid—$C_3H_7.COOH$=88·0624.—(with the characteristic evolution of hydrogen) may also be produced if the fermentation of milk sugar proceed too long, or if the lactic acid is not neutralised by lime or zinc oxide.

Acidum Lacticum Dilutum (B.P. 1885) Sp. Gr. 1·040. Lactic Acid 3 ounces, Distilled Water *q.s.* to 1 pint. *Dose.*—½ to 2 drachms (**2 to 8 Cc.**).

Injectio Acidi Lactici.

Lactic Acid 4 to 6 drachms, Water to 1 ounce. In tuberculous ulceration has been injected into the tissues of the larynx.

Nebula Acidi Lactici.

Lactic Acid 1, Distilled Water 15. Of some use in diphtheria; appears to have the effect of dissolving the membranous exudation.

Spiritus Acidi Lactici.

Lactic Acid 3, Castor Oil 2, Lavender Water 4, Alcohol 90% to 24. Suitable for treatment of alopecia areata. To be rubbed in gently at first, later with some friction.

Calcii Lactas (*B.P.* '14), etc. $\left[C_2H_4\begin{Bmatrix}OH\\CO.O\end{Bmatrix}\right]_2Ca+5H_2O$=308·236.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). *Intravenously*, 5 to 10 grains (**0·3 to 0·6 G.m.**) well diluted has been suggested. *Subcutaneously* too irritating. Causes abscess formation.—per Jl.A.M.A. i./29,1697.

Maximum tolerated dose in dogs intravenously 35 to 40 mgr. Calcium ion per kilo, or 1·5 Gm. in 30 Cc. water for an 8 kilo dog.—A. L. Lieberman, Jl. Pharm. and Exp. Therap. Sept. '30,69. *See also Calcium Gluconate.*

An opaque, white, crystalline powder, antiseptic and stomachic, and given for rickets; soluble in water, 1 in 15 if freshly prepared.

Manufacture.—Pure Calcium Lactate can be made by precipitating the cold saturated solution with Acetone and then washing first with Acetone and then with Ether. B.P. '14 requires 93% pure.

Flavoring.—It is practically tasteless ; if desired to flavor any Glyl or Syl may be prescribed.

Uses.—Urticaria and chilblains have been treated with it. Chilblains are stated by Sir. A. E. Wright to be caused by thinness of the blood, which permits of effusion into the tissues and consequent swelling and inflammation. Is useful to give prior to operation to increase coagulability of the blood, but in a case it was found not suitable *per os.* (According to Dixon must be *injected* to produce the effect—*cf.* Calcium Chapter.) Further, hypodermically, it has produced painful coagulation locally and collapse.

CHILBLAINS in the adult treated with 15 grain doses dissolved in 1 ounce of Chloroform Water with ½ to 1 minim of Capsicum Tincture, thrice daily one hour before meals, to be continued over six weeks. Constipation, which may be expected, is to be corrected by Senna Pod Infusion.

Three 5 grain tablets daily for prophylaxis on an empty stomach before breakfast for a week. For treatment, 9 tablets daily, three before meals. Not to be given in excess.—D. C. Nasmyth, L. i./26,416.

Hæmoglobinuria, œdema of the feet, boils, eczema, scurvy, urticaria, erythema, lichen planus, gouty pruritus, pruritus ani, have also been treated with success. It has also been advocated in epilepsy.

Colour blindness has been treated by Calcium Lactate—the theory being that it stimulates metabolism, hence ought to stimulate retinal cells to respond more to colour sensations.

POST-PARTUM HÆMORRHAGE treated. Six multiparæ, who had suffered more or less from hæmorrhage in previous confinements, treated with 3 Gm. doses *pro die* for some time before delivery. In all the hæmorrhage appeared to be less than normal, but the treatment was not entirely satisfactory. In a girl of 13, however, suffering from metrorrhagia which had refused to yield to Hydrastis or Ergotin, Calcium Lactate arrested the discharge in three days.

ERYTHEMA with periodical return. Drachm doses were most effectual, to our knowledge.

SPASMODIC RHINORRHŒA.—An annual sufferer from hay fever relieved by tapping antrum and washing out, giving Vaccine from the *B. Coli* isolated from the pus and full doses of Calcium Lactate.—L. ii./12,1012. See also W. Mollison, L. ii./29,612.

MIGRAINE aborted by 30 grains Calcium Lactate at first warning of onset. —B.M.J.E. i./26,61.

SERUM CALCIUM LEVEL of normal fasting subjects definitely elevated for extended periods of time by 5 Gm. in 250 Cc. water. No longer necessary to incur dangers of intravenous technique.—J. H. Roe and B. S. Kahn, Jl. A.M.A. i./27,984.

Further on the administration and removal of lime salts, vide Calcii Chloridum.

Calcium Lactate Tablets contain 5 grains each.

Liquor Calcii Lactatis. *Syn.* MISTURA CALCII LACTATIS. *Martindale.*

Dose.—½ to 2 ounces (=15 to 60 grains Calcium Lactate). Calcium Carbonate 4, Lactic Acid (75% strength) 8, Water to 180. This, is stored in well corked bottles, keeps satisfactorily.

Calcii Lactas Recens.—P.J. ii./30,515. The Lactide does not interact.—*Ibid* 587. The amounts used in the writer's Liquor are correct.

At the end of pregnancy the amount of ionised Calcium in the blood tends to rise owing to lessened demands of the fœtus and these salts greatly influence the tone of involuntary muscle fibres. Pregnant women should take 2 ounces of a mixture of this kind every night with Infundibulin 0·5 Cc. intramuscularly night and morning for a fortnight before parturition is due.—W. Blair Bell, B.M.J. ii./21,545.

✱**Kalzana Tablets** (T.M. 408762, Class 3, 410843, Class 42) are stated

to contain 7½ grains of Calcium-Sodium Lactate. To supply calcium deficiency and advised for expectant and nursing mothers and growing children.

Ferri Lactas (Ferrous), Fr. Cx. **P. Belg. IV., P. Ital. V., P. Jap., Ph. Ned. V., F. E. VIII.** $(C_2H_4OH.COO)_2\ Fe+3H_2O=287{\cdot}9548$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In greenish white crystals, soluble 1 in 60 of water; when taken internally is easily assimilated by the system.

Calcii Lactophosphas.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Crystalline or amorphous powder. Is often a mixture of equal parts of calcium lactate and (dibasic) calcium phosphate. Soluble in water. Stomachic tonic. In cardiac disease useful (Brunton).

This salt has properties similar to Calcium Lactate *v. antea.*

Syrupus Calcii Lactophosphatis (*B.P.* '14).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Mix Calcium Lactate 7·5 with Water 40 and add Concentrated Phosphoric Acid 4·5 (volume), dissolve and add Orange Flower Water 2·5. Filter and dissolve Refined Sugar 70 in the solution without heat and add Water *q.s.* to make 100.

Dusart's Syrup. *Dose.*—2 drachms to ½ ounce (**8 to 15 Cc.**).

Calcium Carbonate 9, Lactic Acid 75% 22, Phosphoric Acid 10% 88, Water *q.s.* Dissolve the Calcium Carbonate in the Lactic Acid diluted to 108 with Water with the aid of heat. Cool and add the Phosphoric Acid, and make up to 370. Dissolve in this Sugar 623, and add Spirit of Limes 7. Mix and adjust to 1,000. *All parts by weight.*

Liquor Calcis Lactophosphatis. Lactophosphate de Calcium Dissous Fr. Cx.

Rub Dibasic Calcium Phosphate 17, smoothly with Water 964, add Lactic Acid 19 (Fr. Cx., Sp. Gr. 1·24, practically pure acid) —all by weight. Shake to dissolve; filter.

Syrupus Calcii et Ferri Lactophosphatum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve by aid of slight heat Ferrous Lactate 150 grains with Potassium Citrate 150 grains in Water 1 ounce, and add to Syrup of Calcium Lactophosphate 20 ounces.

Plumbi Lactas. $(C_2H_4OH.COO)_2Pb=385{\cdot}298$.

A white crystalline powder, soluble in water.

Sodii Lactas. $C_2H_4.OH.COONa=112{\cdot}021$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Usually in form of yellowish syrupy liquid miscible with water, containing 75% of the salt. Large doses are said to be hypnotic.

In scorbutic symptoms this is better than sodium citrate.

Diabetes Mellitus, when there is tendency to acidosis, give Sodium Lactate or Citrate in 40 grain doses, thrice daily.—Sir William Willcox. Three cases treated.—B.M.J.E. ii./21,14.

Prior to the use of Chloroform, the administration of Sodium Lactate has been suggested to prevent possible acidæmia.

Elixir Sodii Lactatis. *Dose.*—1 drachm=10 grains.

Prepared with Simple Elixir (B.P.C. 1894), this is a palatable and convenient method of administration.

ACIDI LACTICI BACILLI.

The salient points of Prof. Metchnikoff's well-known Lactic Acid Bacillus Therapy are given. *The subject is further dealt with in Vol. II.*

***Lacteol** (T.M. 317182), ***Lactobacilline** (T.M. 290294, 321883, Class 42), ***Sauerin** (T.M. 297939), and ***Trilactine** (T.M. 302646) are commercial preparations of Lactic Acid Bacilli. **Liquid Cultures** are also on the market. These latter only remain active a month or less. *Moulded* tablets are said show a higher initial count of the bacillus than compressed tablets.

***Trilactine Tablets** contain *B. Caucasicum* as their principal active constituent. They are intended for therapeutic use to be taken *per os* or for curdling milk (*vide infra*). For the former they are best taken in conjunction with a little milk sugar (the bacillus *does not ferment cane sugar or maltose*), *e.g.*, dissolved in a little boiled (and cooled) water.

Dose.—Three to six per diem after meals.

Trilactine Tablets, Intestinal, *i.e.*, coated to render them less likely to dissolve in the stomach than in the intestinal tract, are also prepared. These are not for curdling milk.

The treatment, according to severity and nature of the case, extends over one to three months. *Patient must avoid* foods such as gravy, meat jelly, meat extracts, white of egg, fat meat, high game, etc., which would act as culture-media for proteolytic bacilli.

Lactic Acid Bacilli—Curdled Milk.

Dose.—1 pint or more (less if not tolerated) per diem, divided into 2 or 3 portions.

After the bacilli have appeared in the stools, one daily dose, first thing in the morning or evening, is given. It is usually preferred during or after meals, but if taken on an empty stomach the organisms will pass through to the duodenum with less contamination with the stomach juices. Conduct the treatment for 3 weeks then stop for a period before proceeding again. It should not be given up the second week if flatulence is produced or constipation increased.

Preparation of Curdled Milk.—An agreeable mode of treatment. Sterilization of the milk before introducing the lactic bacilli is essential. An organism dividing three times an hour (as mentioned in a contribution on "Surgical Methods" by Sir W. Watson Cheyne), which is a fair average, will give rise to something like thirty-three million bacteria in twelve hours. To kill all organisms in milk would necessitate exposure to a temperature of 108° to 120° C. (226° to 248° F.), which would give the milk an unpleasant flavour. Pasteurising at 140° F. is not sufficient to kill *B. tuberculosis* or the spores of the butyric bacilli. Metchnikoff hence advised boiling for several minutes. For safety an hour would be preferable, but commercially pasteurised milk may be used after 'bringing to the boil.'

We find the organism grows best at about 44° C. (110° F.) *N.B.*—Acid production ceases at a slightly higher temperature.

The required quantity of milk (a pint or a quart being a customary

day's supply), cooled to about 40° C. (104° F.) (this can be done expeditiously by standing the saucepan with lid on, in a basin of cold water), is placed in a suitable jar or basin so arranged with a small light beneath that a temperature of 40° to 45° C. (104° to 113° F.) —not higher—can be maintained for eight to ten hours,—a ventilated dry heat (hot air) will work satisfactorily. For a pint of milk two or more active Lactic Acid Bacilli Tablets—the quantity varies with the different brands—are crushed, *e.g.*, with a spoon, in a little of the previously heated and then cooled milk (reserved for the purpose), to make a paste and stirred into the remainder of the milk in the jar. For a quart four or more tablets should be employed. The milk will then (or a little later *v. infra*), have formed a junket ready for consumption. If the Curdled Milk be 'over made' (*i.e.*, much whey formed on the top), the heat must be reduced till the correct adjustment is ascertained.

Curdled Milk may be taken, according to taste, either with milk, sugar, or with cream and sugar, or with sugar and a little powdered cinnamon, or ginger as flavoring. It is usually taken 12 to 24 hours after souring has been started. We find in our experiments that, after 8 to 10 hours, *B. Caucasicum* is in great preponderance in the cream—the bacilli appear to be carried up with the milk fat.

The milk must be free from preservatives, pure and fresh.

Pharm. Form. says acid-production in milk begins immediately the milk is drawn from the cow, and in 48 hours sufficient acid (1%) is produced to coagulate the milk at normal temperature. For this reason dairy farmers have been known to add sodium bicarbonate, to counteract acidity and act as preservative. Some medical men think sodium lactate to be provocative of diarrhœa, and object to the addition.

Uses.—Both the Tablets and the Curdled Milk are used for summer diarrhœa in children, diarrhœa and constipation in adults, skin affections, such as eczema and psoriasis, acne and furunculosis, infective disorders of the intestinal tract, such as typhoid, dysentery, for intestinal tuberculosis and tuberculous diarrhœa, and for cancer of the stomach or intestines, and in enteritis and colitis generally. Also as a cholagogue in hepatic congestion and gallstones, and in threatened appendicitis. May be of use in migraine, neurasthenia, and loss of appetite. The Milk acts as a lubricant to the digestive tract, forming a pleasant article of diet, and may be taken in comparative health, as a nutrient and antiputrefactive.

Contra-Indications.—In some cases, notably in chronic acid gastritis, the stomach will not tolerate the Curdled Milk. Many cases of enteritis are aggravated by milk in any form. Personal idiosyncrasy also enters into consideration. Suitable cases, those in which abnormal putrefaction of proteid. Unsuitable, where symptoms due to carbohydrate fermentation.—G. Herschell.

The bacterial flora of the intestine in health and chronic disease.—J. Cruickshank, B.M.J. ii./28,555.

CHRONIC ENTERITIS in infants. Lactic Acid Milk, soured biologically, has high curative value, and possibly of value in infantile eczema and severe urticaria, but use of soured milk in the average home fraught with danger from pathogenic contaminations.—E. Cassie and U. Cox, L. ii./26,325.

B. Acidophilus.—Cheplin and Rettger say Metchnikoff worked with this and not *B. Bulgaricus*.—Pres., Dec. 23,408. It is a first cousin of *B. Bulgaricus* and not easy to distinguish. Doubt as to any real value in the

acidophilus therapy. *B. Acidophilus* is a normal inhabitant of the human intestine. Large quantities of the milk have to be taken, *e.g.*, 1 litre a day, together with 300 Gm. lactose.—B.M.J. i./26,713.

Obstinate Constipation relieved almost without exception by daily doses of milk containing cultures of *B. Acidophilus*. Should be prepared in the laboratory.—L.ii./26,341.

In sprue of benefit.—Jl. Trop. Med., Jan. 15/27, 23.

Bacillus Acidophilus Blocks.

Dose.—3 to 4 daily for 6 to 12 weeks.

Contain *B. Acidophilus* in Agar Jelly covered by a chocolate coating. They have the advantage of small volume, are palatable and contain no laxative drugs.

✱**St. Ivel Lactic Milk** employing either *B. Bulgaricus* or *B. Acidophilus* is issued in card containers sufficient for a week's use, two cupfuls *pro die*. The arrangement is hence convenient.

✱**St. Ivel Lactic Cheese** is stated to contain 1·55% Phosphate calculated as Phosphoric Acid, of which about 68% is in organic combination. *B. Bulgaricus* is also present, and the number of organisms which have been found approach the number existing in soured milk.

✱St. Ivel is T.M. 433956, Class 3. A number of T.M.'s are also on the Register in Class 42.

Ghee.—A constituent of Indian dietary made by inoculating freshly-boiled milk (usually buffalo) with soured milk, and after curdling, skimming off the fat and heating in earthen pots. Practically devoid of Vitamin A.—A. L. Bacharach, B.M.J. ii./30,141.

✱**Yarom** (T.M. 499892).

A Yoghourt type of sour milk, flavoured with fruit juices.

Local Use of Lactic-Ferment Preparations.—A fresh culture of lactic acid organisms has been used to free the urethra from bacteria, *e.g.*, in gonorrhœal infections. An ounce injected night and morning for a week resulted in lactic organisms only being found.

Vaginal Suppositories of Lactic Acid Bacillus.—A hard gelatin capsule (No. 11) is filled with Syrupy Glucose—one daily for gonorrhœa. Upon decomposition of the glucose, acid is formed in which the large Bacillus Doderlein—a normal inhabitant—can grow. The acid kills off the pathogenic bacteria.—P. H. Marsden, P.J. i./20,365.

Cystitis has been treated by irrigation of the bladder with *B. Bulgaricus*.

Vulvitis treated by smearing a paste of Bulgarian soured milk all over the vulva introducing if necessary a tampon soaked in it into the vagina. Combine this with gonococcic vaccine.—T. J. Abraham, Clin. Jl., Feb. 14/23,73.

Buttermilk contains Protein 3, Fat 0·5, Sugar 4·8, Water 91 per cent.

Contains less fat than soured milk. The ordinary Lactic Acid Bacilli found in this are not so active nor resistant as those contained in Bulgarian Sour Milk. Milk in any form, however, in sufficiently large quantity tends to lessen internal putrefaction. Erysipelas has been cured by Buttermilk internally and locally.

Malnutrition in Infancy.—Some cases of atrophy appear to do well on skim buttermilk or unskimmed diluted Lactic Acid Milk. Indeed most children over three months tolerate large quantities of milk if previously soured.—C. Chisholm, L. ii./22,497.

ACIDUM NITRICUM.

HNO_3=63·0158.

"*Poisonous—Not to be taken.*" *For Conditions of Sale v. p.* 38.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

(**B.P. '14.**) Sp. Gr. 1·42, contains 70% by weight hydrogen nitrate. U.S. 68%; Ph. Ned., 50%; P. Helv. and P.G. VI., 25%; Fr. Cx., and F.E. VIII. 63·64%; P. Belg. IV. 63·02%; P. Ital. V., 65·3%.

Uses.—A caustic to warts and condylomata.

Quantitative Estimation.—By reduction with nascent Hydrogen

into Ammonia, which is precipitated as Ammonio-Platinic Chloride or titrated with Standard Hydrochloric Acid.

A direct method of estimation is with the aid of Nitron (diphenylene-anilodihydro-triazole), which gives an insoluble nitrate—the precipitation being quantitative. It also precipitates Picric Acid.—C.D. i./17,286.

Acidum Nitricum Dilutum.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (**B.P.'14**), U.S. IX., Fr. Cx., F.E. VIII. and P. Helv. 10% by weight. P. Belg. IV. 12·6%. Ph. Ned. quadri-normal. Tonic and biliary stimulant.

Sp. Gr. and % Tables.—See Vol. II.

Incompatible with alkalis, sulphides, hyposulphites, ferrous sulphate, and alcohol.

Antidotes as for Hydrochloric Acid, *q.v.*

Chloroform in 5 drop doses every ten minutes will prevent the convulsions following the inhalation of nitrous fumes, as in the accidental breaking of a bottle of nitric acid.

Poisoning by small quantity taken in mistake.—B.M.J.ii./08, 1679.

Acidum Nitricum Fumans. '*Poisonous—not to be taken.*' Sp. Gr. 1·5. (P. Jap. 1·486 to 1·5; P.G. VI. has 86%, Sp. Gr. at least 1·476.)

A reddish-brown liquid, giving off yellowish-red fumes. Contains about 91% by weight of hydrogen nitrate. Used as a caustic.

Acidum Nitro-hydrochloricum, U.S. IX. (Strong). (Not now in U.S.). Nitric Acid 9, Hydrochloric Acid 41, to produce 50. '*Poisonous.*'

Aqua Regia is Nitric Acid 3, Hydrochloric Acid 4. '*Poisonous.*'

ACIDUM PHOSPHORICUM CONCENTRATUM.

H_3PO_4=98·0434.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

Antidotes.—As for Hydrochloric Acid, *q.v.*

Hydrated Phosphoric Acid, containing 66·3% of hydrogen orthophosphate, corresponding to 47·4% of phosphoric anhydride; Sp. Gr. 1·5. Commercially, it is also prepared, having Sp. Gr. 1·75, and containing 64·3% of the anhydride=88·8% H_3PO_4 (U.S. is 85 to 88% H_3PO_4). This strength may be reduced to *B.P.* '14 strength by adding to each 3 parts by weight 1 part of distilled water.

Fr. Cx. and P. Ital. 50% by weight of H_3PO_4. Sp. Gr. 1·349.

'**Acidum Phosphoricum**' P.G. VI. and Ph. Ned. V., is 25%.

See Vol. II. for Analysis and further details.

Acidum Phosphoricum Dilutum (*B.P.* '14).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (**B.P.'14**), U.S., P. Helv. and P. Belg. IV. 10% H_3PO_4. Sp. Gr. 1·057.

Dilute Concentrated Phosphoric Acid (66·3%) 106·3 Cc. with Distilled Water *q.s.* to 1000 Cc.

Incompatible with alkalis, ferric chloride, lime salts.

Uses.—A nerve tonic and hæmatinic. Said to increase the proportion of phosphates in the red blood corpuscles, and to increase the coagulability of the blood. Well diluted, is a pleasant cooling drink in fevers, and relieves thirst in diabetes. It renders iron preparations compatible with astringent vegetable infusions.

ACIDUM PICRICUM.

B.P.'14, P. Jap.; Fr. Cx., P. Ital. V., F.E. VIII., U.S.

Syn. Carbazotic Acid; Trinitrophenol.

$C_6H_2.OH.NO_2.NO_2.NO_2$ [1 : 2 : 4 : 6]=229·0474.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**).

Is formed by cautiously adding phenol to fuming nitric acid, heating the mixture, and purifying by re-crystallizing. It is in yellow, shining, bitter tasting crystals, which melt at 125·5° C.—the yellow liquid may be distilled without decomposition. Heated rapidly to 300° C. in the open it burns.

For details of this and other compounds as explosives, see Vol. II.

Solubility.—1 in 90 of water with yellow colour, and 1 in 10 of alcohol 90%, and in ether about 1 in 20.

Use.—Solutions or ointment are applied in the treatment of burns, erysipelas, pruritus, eczema, chilblains and gonorrhœa. *Local use in skin affections may cause dermatitis.*

Stomatitis Mercurialis. A watery paste of the acid has been applied every 2 days—relieves pain and removes ulceration.

Picric Acid 6 grains in 2 grain doses at intervals of some hours taken without harm. Turns urine orange coloured.—Walter Smith, B.M.J. i./17,618.

Lotio Acidi Picrici, 1% aqueous (St. Th. H.). May be diluted with one or more parts of water, as required.

For burns cotton wool impregnated with this lotion is used. Recommended by H.M. Inspectors of Explosives to keep handy as First Aid for burns.

After 48 hours remove and wash with Potassium Permanganate 5 grains in Water 16 ounces. Washing with weak ammonia and then with hydrogen peroxide removes the stains.

In naval warfare Picric Acid found efficacious as a first dressing, but subsequently moist, and mild antiseptics found more suitable.—Surgeon-General H. D. Rolleston, B.M.J. i./17,224; L. i./17,258.

Burns due to Cordite were treated on H.M.S. 'Lion' and 'Tiger' in the Jutland battle with Picric Acid solution. Found a suitable dressing, but if left on too long it dried and was difficult to remove. As a second dressing 5% mixture of Eucalyptus in Olive Oil, sterilised by boiling, and if acid made alkaline by Lime Water.—B.M.J. ii./16,598.

For burns *not advised.* Permanently scarred faces in the Jutland Battle.—C. P. G. Wakely, M.P.C., July 10, '29,32.

Gonorrhœa treated by 1 in 400 to 1 in 200 solution. An extremely potent germicide, and good when tolerated.—D. Lees, B.M.J. ii./21,480.

Gonorrhœa in women treated with a douche of two teaspoonfuls of Picric Acid in 64 ounces of hot water followed by Protargol Tampon and Ointment.—B. W. Turner, Abst. Pres., Oct., 20/363.

Gauze and Wool, impregnated with **Picric Acid** are prepared.

Pigmentum Acidi Picrici et Camphoræ.—Picric Acid 2, Camphor 50, and Alcohol 90% to 100. Ringworm has been treated with this.

Sig.—"Inflammable. To be painted all over the scalp twice daily." The hair is to be clipped quite close, and the scalp washed once or twice a week, and covered by a calico cap. Generally the ringworm hairs are loosened, and come away with their bulbous portions in from ten to thirty days. A slight yellow staining of the hair may be noticeable some weeks after treatment.—A. W. Williams, Brit. Jl. Dermat., June, 1912.

Unguentum Acidi Picrici, 1 to 3%, for pruritus of scrotum and gonorrhœa.

For burns : Relieves pain and may be left 48 hours without changing. For burns of the eye, Ointment 2% preferred by some to solution, using a little cocaine solution beforehand.

Collapsible Tubes of Picric Acid Ointment, ½% in soft paraffin basis, are supplied with catheter attachment for urethral medication.

Papillary erosions of the cervix uteri have been treated with saturated alcoholic solution swabbed for three minutes twice or thrice weekly.

Vaccinated surfaces treated by painting with a 4% alcoholic solution 48 hours after insertion of the lymph, lessens the degree of reaction. Makes a kind of natural dressing. Picric Acid is stated to be about four times as efficient as phenol as a local antiseptic.

Ammonii Picras.—$C_6H_2(NO_2)_3O.NH_4$=246·0788.

Dose.—⅙ to ⅓ grain (**0·01 to 0·02 Gm.**) in solution.

Yellow crystals *exploding* if rapidly heated in a test tube, but without loud detonation. To our knowledge 4 ozs. in a bottle were dropped and the bottle broken on the stone footway without exploding.

Soluble 1 in 100 of Water, 1 in 85 Alcohol.

Uses.—This and the Potash Salt have been thought to act like Quinine ; they are also used for hardening tissues prior to microscopic examination and as a urine test for albumin, *q.v.*

Malaria has been treated by Ammonium Picrate in India.

Mistura Ammonii Picratis.

Dose.—½ ounce (**15 Cc.**) thrice daily.

Saturated Ammonium Picrate Solution 30 minims, Syl Aurantii 1 drachm. Water to ½ ounce.

Indicated after febrile diseases with loss of appetite and asthenic condition. Generally given with a clean tongue, but even when dirty the salt does not seem to disagree. It takes the place of strychnine to a great extent, and is a really valuable drug. In explosive factories it is stated workmen take it as a bitter tonic.—F. Fowler Ward, Ipswich.

ACIDUM PYROGALLICUM.

Syn. Pyrogallol, U.S. X., Ph. Ned. V. $C_6H_3(OH)_3$ 1 : 2 : 3= 126·0468.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**) in aqueous solution, or in pills with syrup—freshly prepared, and kept from the light.

Manufacture.—By heating gallic acid.

In light small white odourless crystals, with M.Pt. 131 to 132° C., producing a sensation of coolness on the tongue. It has great affinity for oxygen.

Solubility.—One in 2 parts of water, about 1 in 1 of alcohol 90%, and in 10 parts of melted lard.

Uses.—Antiseptic in skin affections and in ringworm. Ointment 2 to 10% sometimes combined with Salicylic Acid 2 to 5% and Ichthyol about 5%. It darkens the skin, used with Silver Nitrate blackens the hair. Large doses poisonous. Seldom used internally.

Lupus vulgaris, if the area is not too large, 40% plaster as caustic,

afterwards 10% Ointment is a good treatment, or apply the Ointment for a long time (until blister rises), then proceed with 2% Ointment, finally with a weak (0·1%) ointment.

SYPHILITIC ULCERATIONS, resistant to usual treatment, well treated with Pyrogallol Ointment—2% for two days, 10% for two days, 20% for two days, and 30% for 8 days. The urine has to be controlled (black coloration with overdoses), undermined edges removed, and surrounding tissues protected with Zinc Paste.—Jl.A.M.A. ii./25,314.

Fatal poisoning following treatment of a universal psoriasis with ointment containing Pyrogallic Acid. Patient collapsed five minutes after covering about 2/3 of body with ointment. Estimated absorption of about 10 Gm. of Pyrogallic Acid.—per Jl.A.M.A. ii./25,555.

Acidum Pyrogallicum Oxidatum (*Syn.* PYRALOXIN). A brownish insoluble powder prepared by the action of air and ammonia on Pyrogallic Acid. 3 to 10% ointment for skin affections.

Eugallol, $C_6H_3(OH)_2(CH_3COO)$=168·0624 Pyrogallol-Monacetate.

Manufacture.—Add Acetyl Chloride 78 to Pyrogallol 126 with stirring. When thoroughly mixed heat to 60° C. ½ hour. Neutralise the syrup with Sodium Carbonate and extract with ether. This product is mixed with 50% Acetone (*i.e.*, 2 of product and 1 of Acetone).

A yellowish syrupy liquid, applied in skin affections mixed with an equal quantity of acetone with a brush. **Lenigallol.** Pyrogallol-Triacetate, $C_6H_3.(CH_3.COO)_3$ = 252·0936 in white powder, is much weaker, may be used with zinc paste in acute and chronic eczema.

Manufacture.—Lenigallol is made by combining Pyrogallol 1, with Acetic Anhydride 3, in presence of fused Sodium Acetate 3 at boiling temperature. The oily compound solidifies on cooling, and is recrystallised. M. Pt. 157° C.

ACIDUM SALICYLICUM.

In numerous National Pharmacopœias.

$C_6H_4.OH.COOH$ 1:2=138·0468. *Syn.* ORTHO-OXY-BENZOIC ACID.

Meta and *para* Oxybenzoic Acids have very feeble action of any kind—either anti-rheumatic or anti-fermentative. Much larger doses—135 and 180 grains respectively—are required to kill rabbits than with Salicylic Acid (60 to 90 grains).—R. Stockman, B.M.J. i./13,598.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in cachets.

FR. CX. *Max. single dose* 1 Gm.; max. during 24 hours 4 Gm.

Manufacture.—Salicylic Acid (artificial acid) of commerce is made by H. Kolbe's method devised in 1874, by heating Sodium Phenate in a current of Carbonic Acid, or by a modification of it. The Basic Sodium Salicylate so formed is decomposed with Hydrochloric Acid. A modification (R. Schmitt's) consists in heating the Phenate and Gas under pressure; this is more economical. *Potassium* Phenate is also employed as starting point.

It may also be prepared from Salicin and from Oil of Wintergreen (*Gaultheria procumbens*,—*Ericaceæ*) and sweet birch (*Betula lenta*,—*Betulaceæ*). **For internal use** this NATURAL ACID is preferred. An artificial acid, **Physiologically Pure**, is also in commerce.

In colourless prismatic crystals, odourless, but its dust irritates the nostrils, taste sweetish. M. Pt. 156° to 159° C.

Soluble 1 in 500 of cold water, 1 in 3·5 of 90% alcohol, 1 in 40 of 45%, 1 in 2 of ether, about 1 in 80 of olive or almond oil, 1 in 100 of castor oil, 1 in 200 of glycerin, and 1 in 55 chloroform; soluble also in melted fats and soft paraffin. Borax, ammonium citrate and sodium phosphate increase its solubility in water.

Incompatibility.—Spirit of nitrous ether, quinine salts, sal volatile. An aqueous solution of the acid gives a deep violet colour with a trace of a persalt of iron.

Uses.—Anti-fermentative and anti-putrefactive. For various febrile conditions generally as one of its salts, particularly for acute rheumatism, *v.* Sodium Salicylate. In stomatitis a saturated aqueous solution is used. Large doses alone act as a direct poison on the heart and affect respiration. For sweating feet Pulvis Salicylicus cum Talco is used. It is applied to corns, warts and lupus.

A saturated aqueous solution as **Rectal Injection** has been used for dysentery of children.

To eradicate stumps left after removal of papillomatous growths 1 to 6% solutions in spirit. It may also be used dissolved with sodium sulphoricinate.—*q.v.*

For scarlatinal sore throats and tonsillitis, compresses of 2% Alcoholic Solution found of value. In gonorrhœa, may prove irritant, necessitating periodical dropping and renewal.

Typhoid should be treated by 3 to 5 grain doses given with milk so as to be carried more quickly into the bowel.—A. Wilson, B.M.J. i./15,331.

To remove tattoo marks, mass Salicylic Acid with glycerin to a dough—apply over the marks with a compress and strips of adhesive plaster and allow to remain in contact for a week. After the first dressing the epidermis over the marks is removed and a fresh application of the Salicylic paste applied. Usually the second application removes.

Dermatitis may in some instances be caused by the external use of Salicylic Acid and its derivatives.—Y.B.P., '24,341.

Septic wounds treated by hypertonic saline to which 2 to 3 drachms of saturated solution of Salicylic Acid in Alcohol is added to the pint—the crystals thrown out are deposited on the wound. Salicylic Gelatin 2 to 4% also used.—L. G. Anderson and co-workers.—L. i./16,1119.

Adsorption through the Skin.

Salicylic Acid can be transported through the epidermis into the connective tissues and thence into the blood stream. The colloids of the connective tissues retain the drug by adsorption and from these surfaces it is liberated gradually, passes into the blood and is mainly excreted by the kidney. The excreted portion may be estimated colorimetrically in mg. per 100 Cc. urine, and if the quantity of urine voided in the 24 hours is known the total urinary excretion of Salicylic Acid may be calculated. Adsorption may take place from Soft Paraffin, Alcohol and Water, but the first is probably best.—H. Leslie-Roberts, Brit. Jl. Dermat. & Syph., Aug., '28,325; per Jl.A.M.A. ii./28, 1409.

Elixir Acidi Salicylici Compositum.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) well diluted with water.

Each ounce represents Salicylic Acid 40 grains (as Sodium Salicylate), Gelsemium 8 grains, Cimicifuga 15 grains and Potassium Iodide 4 grains.

In chronic gout and rheumatism, lumbago, and sciatica. It is antirheumatic, analgesic and the eliminative action of small doses of Potassium Iodide is useful.

Ⓟ**Emplastrum Acidi Salicylici Saponatum.** Salicylic Acid 2½, 5 and 10% in Emplastrum Saponis.

Liquor Acidi Salicylici.

Boiling Distilled Water 1,000 parts, Salicylic Acid 1½ parts, a good antiseptic gargle. A useful solvent for alkaloidal and other salts; it is irritating to the eyes.

Lotio Acidi Salicylici cum Borace. Mid. H. Salicylic Acid 4, Borax 2, Glycerin 15, Alcohol 90% 15, Water to 140. For use in urticaria, prurigo and itching affections

Pulvis Salicylicus cum Talco.

Salicylic Acid 3, Wheat Starch 10, Talc 87.

Mix to form a fine powder. For perspiration of the feet.

Ⓟ Salicylic Cream or Paste.

Salicylic Acid, in powder, 2, Carbolic Acid 1, Glycerin 10; mix. G.H. had Salicylic Acid 1, Glycerin 9.

Used as pigment when the skin is irritated by the discharge from wounds, &c., under antiseptic dressings.

Oleum Acidi Salicylici.

Scabs in eczema are well treated by Salicylic Acid dissolved in Castor Oil.—We suggest 1 in 50. This dissolves on warming.

Unguentum Acidi Salicylici (*B.P.* '14).

Salicylic Acid, in powder 1, White Paraffin Ointment 49. Useful in eczema, acne, ringworm and cancer.

In seborrhœa, the following is useful; Salicylic Acid 1, Precipitated Sulphur 2·5, Cold Cream 25.

Lupus vulgaris, scabies, acute eczematous dermatitis and ringworm treated by 50% Salicylic Acid Ointment.—Sir Archibald Reid, L. i./23,1325.

Unguentum Acidi Salicylici Compositum.

Syn. WHITFIELD'S OINTMENT.

Salicylic Acid 1, Benzoic Acid 1, Cocoa Nut Oil 12, Soft Paraffin 16. For ringworm.—L. i./17,222.

Salicylic Gauze, Lint and Wool, each 4%.

Dissolve the Salicylic Acid in alcohol, *q.s.* (about 1=1 of dressing) and impregnate under pressure: dry.

Salicylosol.—A solution of Salicylic Acid in a partly oxygenated mineral oil. Used by massage into the skin. When 10 Cc. of the solution was rubbed into the skin, 0·137 Gm. of Salicylic Acid appeared in the urine in 24 hours. Hanzlik found that a normal person excreted 40% of a dose of a Salicylate given *per os* in 24 hours. The absorption of Salicylic Acid from inunction is therefore only about one-third of the absorption of Salicylic Acid given *per os*. —B.M.J. i./22,233.

✱**Iodinosol** (T.M. 336541). A preparation containing 6 and 10% of Iodine in a base similar to Salicylosol for inunction.—B.M.J. i./22,233.

Capsules containing Iodinosol 6% 10 minims are made.

Mycozol.—An ointment containing Salicylic Acid 4%, Mercury Salicylate 4%, and Chloretone 5%, with aromatics for treatment of epidermomycosis (athlete's foot) a fungous infection, also for jockey strap itch and ringworm of feet and hands.

Ammonii Salicylas U.S. $C_6H_4.OH.COO.NH_4$=155·0782.

Ph. Ned. V. with $\frac{1}{2}$ H_2O.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). U.S.—*Average,* 15 grains.

In crystalline powder, very soluble in water.

'Merely another Salicylate,' possessing no special advantages over Sodium Salicylate, or over other Ammonium salts. Can be dispensed with from the materia medica.—C. C. Johnson and P. J. Hanzlik, Jl. Ph. & Exp. Ther., July, '29,332.

Ferri Salicylas. *Syn.* FERRIC SALICYLATE. Composition varies.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Brownish powder, sparingly soluble in water, but readily in solution of Potassium Bicarbonate.

In tonsillitis as an antiarthritic tonic and as a dusting powder for foul wounds. Useful in erysipelas and acute tonsillitis in solution formed by interaction of 7½ grains each of Sodium Salicylate and

Potassium Bicarbonate and 7½ minims of Ferric Chloride Solution B.P. with diluent *q.s.*—M.C.S. Lawrence.

Mistura Ferri Salicylata. COHEN'S SALICYLATED IRON MIXTURE.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) increased.

Dissolve citric acid 14 in distilled water 200, add ammonium carbonate 6·5, then dissolve sodium salicylate 125 in this solution; add tincture of ferric chloride, 125, glycerin 175, and oil of betula 4, and then add sufficient distilled water to make 1,000, and filter.

The question has been asked: Do the Salicylates and kindred drugs stimulate or exhaust thyroid activity or do they actually neutralise it?

Magnesii Salicylas. $(C_6H_4.OH.COO)_2Mg,4H_2O=370·4604$.

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Colourless crystals. ***Soluble*** 1 in 6 of water. Incompatible with acids and Sodium Bicarbonate. It has been given in typhoid.

In flatulence 15 to 45 grains thrice daily has been found useful.

Potassii Salicylas. $C_6H_4.OH.COOK=176·139$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). A white crystalline powder, very soluble in water.

Has given relief in rheumatic affections of the eyes.

Sodii Salicylas (*B.P.* '14). U.S. X. $C_6H_4.OH.COONa=160·036$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in a mixture or in cachets. FR. CX.—*Max. single dose,* 30 grains. Max. during 24 hours, 180 grains approximately; F.E. VIII. 140 grains.

Intravenously, doses as large as 15 grains (**1 Gm.**) have been given, also in combination with the same amount of Sodium Iodide (*see* Injectio Sodii Salicylatis.)

In white scales or shining tabular crystals (of sweetish taste). For varieties in commerce, compare Salicylic Acid.

Soluble in water 1 in 1. Concentrated solutions should be made with hot water and filtered. In alcohol 90% 1 in 6 by experiment.—W. H. M.

Storage.—P. Belg. IV. directs to be kept in the dark.

Incompatible with free ammonia, ammonium carbonate, and aromatic spirit of ammonia (turns brown). Mineral and many organic acids cause separation of salicylic acid, *e.g.*, to dispense Sodium Salicylate with Tincture of Perchloride of Iron, dissolve 1 drachm of the salt in 2 ounces of Water, add 30 to 40 minims of the Tincture and 1½ ounces of a solution of Potassium Bicarbonate 1 drachm in 1 ounce, then Chloroform Water to 8 ounces. The result is a clear palatable claret-colored mixture useful in rheumatic sore throats combined with anæmia.

In the case of a Sodium Salicylate, Tincture of Ferric Chloride and Sodium Bicarbonate mixture, a Sodium Ferryl-Salicylate is formed.—J. Rutherford Hill, P.J. i./26,358.

Flavoring.—Syl Lavandulæ, Glyl Pini, Syrupus Aromaticus, Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Germicidal Action. Almost nil. *For our experiments see Vol. II.* For antirheumatic effect *vide* R. Stockman's work, *postea.*

Uses.—Rheumatism, neuralgia, diarrhœa (of young children said to be almost specific), vertigo, Menière's disease, malarial fevers and diabetes may all be well treated by salicylates. In influenza and acute tonsillitis, 10 grains every three hours relieve the distressing

symptoms. Puerperal fever, biliousness, acute pains of fibrositis, nephritis, cystitis, urticaria and Graves' disease have been well treated with it. It is considered the most powerful of hepatic stimulants. As a urinary antiseptic (*per os*) it has less action than Hexamine—about 50% of that given is excreted as Salicyluric Acid.

In sciatica the electro-negative salicyl ions have been used by Iontophoresis.

In acute rheumatism some advise very large doses, *e.g.*, 150 grains daily, with twice the amount of Sodium Bicarbonate or even *double* these amounts. Sodium Bicarbonate should always accompany it to prevent constipation. It is thought to counteract the acid toxins.

Rectal injections of 8 Gm. in 150 Cc. with 1·5 Cc. Opium Tincture have been employed.

Stockman has shown that the fall of temperature under treatment with Salicylate and return of joints to the normal, varies within limits with the dose administered.

The COOH grouping *in* the Benzene ring in conjunction with the OH in the ortho- position seems to place Salicylic Acid at the highest point of efficacy of all anti-rheumatics: with 2COOH introduced, as in Phthalic Acid, efficacy vanishes. The Cresotinic Acids are the only bodies at all approaching Salicylic Acid in utility. It is not known definitely whether the Salicylates act as antitoxins or as antimicrobics. In acute rheumatism 90 to 160 grains or more in 24 hours act when infection is recent and when the inflammation is confined to joints, but when fibrous tissues of the heart valves or of the muscles *or* body generally are deeply implicated a more potent remedy is wanted.—R. Stockman, B.M.J. i./13,598.

Rheumatic Infection.—For immediate treatment the Salicylates are the most efficacious of remedies at present known.—G. A. Allen, Pres., Nov.,'26,400.

Salicylates appeared best in preventing subsequent carditis developing, next in order being Arsenic, sedatives giving rest only.—Mary Bertram, B.M.J. i./25,496.

Rheumatic Polyarthritis well treated by ***large doses,*** giving 10 times daily at 2-hourly intervals 50 Cc. of a solution containing 30 Gm. Sodium Salicylate, 60 Gm. Sodium Bicarbonate, 300 Gm. Syrup of Orange, and Distilled Water to 1000 Cc. When fever and pains have disappeared, reduce to 4-hourly intervals. Quick cure in acute cases, and the accompanying endocarditis is improved or cured.—J. T. Peters, Jl.A.M.A. ii./29,958.

Pruritus Ani.—The itching may be instantly relieved by the application of a very minute quantity of Sodium Salicylate.

In Typhoid suggested to give 3 to 5 grains in intestinal capsules.

Chorea believed to be always rheumatic, at least in part, therefore give Sodium Salicylate lest fresh rheumatic manifestations develop, which might thus be avoided. Smaller doses advocated than those of Lees (with Sodium Bicarbonate). Before starting treatment bowels should be freely opened, and before increasing dose evacuation should have taken place during preceding 12 hours. Chloretone as sedative sometimes useful in 3 to 5 grain doses.—F. Langmead. R. Stockman does not believe in the Salicylic treatment of chorea, but prefers Arsenic and nerve sedatives.

Anti-diarrhœic Action.—It was used in the war. Men going within the hearing of big guns for the first time received 15 grain doses, preventing the otherwise involuntary motion.

Sympathetic Ophthalmia treated with Sodium Salicylate: large doses—one grain for each pound of body weight in the course of from 10 to 14 hours, *i.e.*, for patient of 140 pounds, seven doses of 20 grains are given at intervals of an hour and a half.—Jl. A.M.A., Sept. 11/20,725, per Pres., Feb./21,74.

Encephalitis Lethargica treated by Sodium Salicylate, 15 to 30 grains every 4 hours. When there is insomnia give 5 to 10 grains of Bromide and Iodide of Potassium.—A. G. Gullan, B.M.J. i./25,1120.

Toxicity of Salicylates. Mean toxic dose for males of the synthetic Sodium Salicylate was 180 grains, for females 140 grains; of the natural Salt 200 and 135 grains respectively; of Methyl Salicylate 120 minims alike for

males and females; of Aspirin 165 and 120 grains respectively. The doses in arriving at these figures were given until symptoms of intoxication appeared. —P. J. Hanzlik, L.i./13,1811; Jl. A.M.A., March 29, 1913.

Excretion of Salicylic Acid. About 20 Cc. of a 10% Sodium Salicylate solution given hourly until toxic symptoms appeared—*i.e.*, after an average of 13·8 Gm. of Salicylic Acid had been taken. Fluid was then taken regularly until salicylic acid disappeared from the urine. The total excretion (60%) in acute rheumatism was about 15% less than in normal persons (75%). —B.M.J. ii./17,296.

(A statement by Devrient, Arch. Exp. Path. Pharm., 1921,90, p. 242 (J.C.S.A. i. 21,909) is to the effect that not more than 15% of the acid administered is excreted in the urine.)

Salicyl reaction obtained from urine 27 hours after taking 2 Gm. of Sodium Salicylate. An investigation into the metabolism of Salicylic Acid resulted in the isolation of Salicyluric Acid from the urine and gave no evidence for the destruction of Salicylic Acid in the body.—E. G. Holmes, Jl. Ph. & Exp. Ther., Nov., '25,297—313.

Sodium Salicylate Tablets, 3 and 5 grains (**0·2 and 0·3 Gm.**).

Effervescent Sodium Salicylate. This is made in two strengths—5 and 10 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**) or more.

Injectio Sodii Salicylatis. *Dose.*—15 to 30 minims (**1 to 2 Cc.**). 1 in 20 of sterile water or weaker.

RHEUMATIC PAIN.—Injected into an acutely inflamed rheumatic joint, the pain disappears and the patient is able to move his joint. This points to a specific action, since analgesia is central.—Dixon, p. 255.

Intravenously, 1 Gm. doses have been given in rheumatic affections. The stimulation is more rapid than in doses *per os.*

ACUTE RHEUMATISM.—Refractory cases treated by large doses intravenously.—B.M.J.i./31,70.

'OPSONISED SALICYLATE' in rheumatic fever. Into a 20 Cc. syringe first 5 to 8 Cc. of 20% Sodium Salicylate solution, then 8 to 10 Cc. of blood from patient's median basilic vein. After 4 minutes it is injected. Temperature dropped and patient better.—L. i./29,245.

PSORIASIS.—In selected difficult cases, intravenous injections (10 Cc. of a 20% solution, three times weekly for 4 or 5 weeks) appear to be of definite value.—B.M.J.E.i./25,26.

TYPHUS FEVER treated with encouraging results by Sodium Salicylate intravenously, injections, frequently up to 5 and 6 Gm., being given daily. Myocarditis a contraindication.—Jl. Intrav. Therap., Jan. '26,20.

ENCEPHALITIS LETHARGICA well treated by Sodium Salicylate intravenously. —L.i./24,1011.

PNEUMONIA.—Injections of a 1 in 30 solution (dose not stated.—W. H. M.) intravenously efficacious in all pneumococcic pulmonary infections.—per Jl. A.M.A. ii./29,1078.

Sterules of Sodium Salicylate ***for hæmorrhoids*** contain 1 Cc. (15 minims) of 30% solution.

Hæmorrhoids treated by interstitial injection of this solution. Results as good as those obtained with Carbolic Acid (*vide* Hamamelis) but the pain immediately after the injection is more severe and lasts longer.—J. Dunbar, B.M.J. ii./23,809.

Sterules of Sodium Salicylate ***for varicose veins*** (Sicard and Paraf) contain ***3 Cc.*** of ***20%, 30%*** or ***40%*** solution.

Varicose veins have been cured by injecting into them a 20% solution of Sodium Salicylate, followed by 30% solution a week later, and by 40% later on if necessary. Produces obliteration of vein and is not caustic or toxic: 100 cases cured.—Sir S. Alexander, L. ii./26,176. Of value, but complications frequent. Should be used with caution.—V. Meisen, L. ii./26,662.

V. Meisen used later **Sodium Salicylate 25% and Sodium Chloride** 10%, which is practically painless. *Max. dose* 10 Cc. Cannula (not too sharp) is inserted with patient standing: rotate once or twice when blood flows from it to see that it has not caught in the opposite wall. The patient then lies down with leg on a special stand. When varices are empty commence injection very slowly, stopping if flow is resisted or if patient feels pain. For injections in the neighbourhood of the malleoli inject ½% Novocaine direct into the varix. Massage lightly after injection. Repeat the treatment every other day and if both legs are affected treat one every day. Reference is also made to Sicard and L. Humbert.—L. i./27,1355.

Sodium Salicylate injections (strictly intravenous) are safer in pregnancy and during menstrual period than Quinine-Urethane, commencing with 20 to 30% solutions, and passing on to 40%, 8 to 10 Cc. of the 20%, 5 Cc. of the 30%, or 3 to 4 Cc. of the 40%, is the customary dose at each sitting. It is important to work up to the maximum strength as soon as possible as the veins quickly accustom themselves to the injections. There are several disadvantages, including possible loss of time in testing sensitivity of the patient, acquirement of tolerance by veins if they are not quickly obliterated, cramp during administration, ulceration if leakage occurs, uncontrollable effect.—A. H. Douthwaite, "The Injection Treatment of Varicose Veins," H. K. Lewis, 1927.

It is unwise to give more than 5 Cc. of 40% solution at a time, though 10 Cc. of weaker dilution may be used initially.—W. S. C. Copeman, B.M.J. ii./26,614.

The 40% injection was found painful but the results were good. 1 Cc. of 20% Sodium Chloride should be injected into an inch length of a vein previously emptied and kept so for a minute after the injection. No local anæsthetic is needed, but if advised a ½% Novocain Solution.—B.M.J. ii./27,46.

The following are more recent expressions of opinion—arranged approx. chronologically.

Operation seems no longer justifiable except in certain very isolated cases.—G. H. Colt, B.M.J. ii./28,527.

The standard injection now for a medium-sized vein is 5 Cc. 30% solution (10% saline), and for a large vein 7 Cc. 40% solution. Inject with limb emptied of blood and from below upwards. The effect can be judged after a fortnight. Local analgesics added to allay the pain found entirely negative.—G. H. Colt, B.M.J. ii./29,850.

25% Saline with 5% Salicylate is a good average 'guidable' solution for those who prefer Saline to Salicylate.—G. H. Colt, B.M.J. i./30,760.

This authority has tried a large number of variations in strength of both ingredients. He writes us ***'None seem so certain as Salicylate 30 to 40% in Sodium Chloride 10% (V. Meisen's formula)'.*** It causes however much pain.—Feb. 1931, and again, Oct. '31. 'Solutions can be divided into painful and guidable

and painless and not guidable. With myself the Salicylate-Saline results continue to be excellent and more reliable and permanent than others.'

Injection treatment regarded as unscientific. The same applies to hæmorrhoids.—Archibald Young, L. i./29,467

Reply to Prof. Young's criticisms by R. T. Payne and H. M. Hanschell, L. i./29,578.

A. Young replies—a good rejoinder. *Inter alia*, is thrombosis, or is it not, a thing the surgeon is justified in deliberately inducing ? L. i./29,634.

Sclerosing agents used with safety for 6 years in Chile.—S. M. Wells, L. i./29,951.

Salicylates, 30 and 40%, intensely painful.-Alan Perry, L. ii./29,901.

20% Sodium Salicylate causes no 'Salicylate cramp.'—L. P. H. Crivelli, B.M.J. i./30,618.

Relative value of sclerosing solutions. Sodium Salicylate painful and accompanied by cramps in the calves. Even a small quantity getting into the tissues is irritant. A large percentage do not 'take,' D. Levi, L. ii./30,16.

Injections should be given with patient recumbent.—R. Thornhill, B.M.J. ii./30,161.

Poisoning following 4 intravenous injections of 5 Cc. 20% Sodium Salicylate solution for varicose veins,—oedema, urticaria, nausea, and vomiting.—B.M.J.E. i./28,31.

The following are general statements, 'Twin' Injections, etc.

Valvular defect and varicosis. Details of exciting factors.—W. Turner Warwick, L. ii./30,1278.

Lithium Salicylate 30%, with Tutocaine 0·75%, scleroses well and produces no symptoms. **Sodium Chloride** 20% with Tutocaine 0·75% good for small veins, especially if thin-walled and the skin over them atrophic. It should however not be used in large healthy veins. **Quinine-Urethane** best from point of view of thrombosis but many do not tolerate it even in smallest doses. '**Twin injections**' good, viz., 4 Cc. **Lithium Salicylate** solution and 2 Cc. of **Quinine-Urethane** simultaneously, injections being 3 to 5 inches apart. Only to be used if veins are very large. The Lithium solution to be given first.—N. Scott, B.M.J. ii./30,58.

Discussion of N. Scott's technique.—A. R. Rooke, B.M.J. ii./30,121.

Sodium Morrhuate is less painful than Quinine Urethane, but thrombosis followed.—A. H. Winchester, B.M.J. ii./30,120.

Injection of undiluted Liquid Carbolic Acid, 2 to 4 minims, preferable to Quinine-Urethane, Sodium Salicylate, etc. which give rise to considerable pain and are dangerous in cases of idiosyncrasy. The Carbolic Acid is at once locked up in the clot which forms immediately. 4 minims is sufficient to obliterate a large varicose saphenous vein. The injection is practically painless and the vein almost immediately hardens. Four to eight veins may be injected at a sitting. Veins do not become immunised to the acid.—P. P. Dalton, B.M.J. ii./28, 1037.

Lithium Salicylate 30% with 1% **Tutocain,** 5 Cc. injections into the larger veins and a similar amount of Sodium Chloride solution 20% with Tutocain added, for smaller veins at weekly intervals until sclerosis is complete.—P. M. Deville, B.M.J. ii./30,1000.

Lithium Salicylate 30% with Tutocain 1%, 4 Cc. and Quinine Urethane 2 Cc. Quinine Salicylate deposited.—R. H. Maingot, B.M.J. i./32,1054.

Varicose Ulcers.

As the result of a questionnaire of 550 medical men, A. P. Luff concludes that the treatment is best limited to two procedures; (1) Injection of veins (preferably with Sodium Salicylate) in combination with Unna's Zinc Gelatin for local treatment; (2) Unna's Zinc Gelatin alone if injection is refused or cannot be done. Ultra-violet light treatment appears very reliable in the hands of experts. The rational method of prevention of varicose ulcers is the obliteration of varicose veins.—B.M.J. ii./28,1146.

See also Glucose, Quinine-Urethane, Sodium Morrhuate, Sodium Chloride and Therapeutic Index.

Sterules, Intravenous, of Sodium Salicylate, 15 grains (**1 Gm.**) in 320 minims (**20 Cc.**), and combined **with Sodium Iodide, 1 Gm.**

In chronic arthritic affections this combination is good.

According to Connor (Med. Rec. vol. 85, 323, 1914), Hall (Med. Times, May, 1920), and others, the relief of pain in rheumatic affections is more prompt by giving Sodium Salicylate intravenously than by giving it *per os*. Salicylates are of great benefit in acute arthritis and this affection has been thought to be a symptom of streptococcal infection. Salicylates are of less curative effect in so-called chronic arthritis. The latter is no doubt a mixed infection. Where the infection is of a chronic nature, only a transient analgesic effect is produced by Sodium Salicylate, but the best (more permanent) results are to be obtained by using Sodium Iodide in addition.

Acute Sciatica. Effect sometimes dramatic—better than *per os*. —F. J. W. Porter, L. ii./25,1306.

Mistura Sodii Salicylatis. *Dose.*—1 ounce (**30 Cc.**).

Sodium Salicylate 10 grains, Aromatic Spirit of Ammonia ½ drachm, Belladonna Tincture 5 minims, Chloroform Water to 1 ounce. For a common cold, every four hours.—Pr. Mar. 1911.

Sodium Salicylate not so certain in its effects as Quinine and invariably caused cramps.—Reginald Payne (St. Bart's.), B.M.J.i./32,238.

Oleum Gaultheriæ (*B.P.* '14). *Syn.* Wintergreen Oil.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

The Distillate from *Gaultheria Procumbens, N.O. Ericaceæ,* and from the bark of *Betula Lenta* (*Betulaceæ*) are practically identical, *cf.* Methyl Salicylate. *Characters and Tests.*—Colourless liquid with strong characteristic odour and pungent taste. Sp. Gr. 1·180 to 1·187; O.R., 0° to—1°; R.I., 1·537 to 1·539; Soluble 1 volume in 6 of 70% Alcohol at 25° C. Should contain at least 99% Methyl Salicylate determined by the saponification process. Stimulant and diuretic.

Maceration of the leaves for 12 to 24 hours prior to distillation is necessary for the best yield, the oil being a "ferment" oil not pre-existing in the plant, but occurs as a non-odorous glucoside, which must be hydrolised by the ferment before distilling.

Capsules of Gaultheria Oil—10 minims in each. *Dose.*—One three times a day or oftener.

The oil has similar properties to salicylic acid. 10 to 20 minims are given every 3 or 4 hours in rheumatism and sciatica. With olive oil externally for rheumatism.

Methyl Salicylas (*B.P.* '14). (98% pure.) $C_6H_4.OH.COO.CH_3$ =152·0624. Artificial (or Synthetic) Oil of Wintergreen.

Dose.—5 to 15 minims (0·3 to 1 Cc.).

U.S. X. gives Oleum Gaultheriæ and Oleum Betulæ from the bark of *B. lenta* (Sweet Birch) as synonymous with Methyl Salicylate.

P. Belg. IV. directs Methyl Salicylate to be given when Essence de Wintergreen is prescribed. F.E. VIII.—May be either synthetic or natural. P. Ital. V. —Synthetic only.

A colourless liquid, with Wintergreen odour. ***Manufacture.*** —May be prepared by carefully distilling a mixture of Salicylic Acid 2, Methyl Alcohol 2 and Sulphuric Acid 1. Sp. Gr. 1·185 to 1·192. ***Soluble*** in 90% alcohol, ether, chloroform or glacial acetic acid. Applied covered with impermeable tissue is quickly absorbed.

In local rheumatic pain an efficient application.—R. Stockman, B.M.J. i./13,597. *See also* **Methyl-Aspriodine.** Also used for furunculous ulcers, orchitis, and mumps.

Bile secretion is increased by Methyl Salicylate *per os* without causing loss of body weight. Animal experiments.—P.J. ii./16,615.

Poisoning due to swallowing one ounce of Methyl Salicylate. Recovery after forcing liquids by the mouth, 2% solution Sodium Bicarbonate by proctoclysis, and wrapping patient with blankets.—Jl. A.M.A. ii./25,306.

Less than 15 Cc. *per os* has caused more than one fatality in infants. 13 cases of poisoning have been recorded, with 6 deaths.—B.M.J.E. i./28,57.

* **Methysal Balm** (T.M. 303967).—*Martindale. Syn.* **Unguentum Methyl Salicylatis Compositum.**

Contains Methyl Salicylate 7, in combination with Menthol 5%. Also prepared containing 25% and 33% Methyl Salicylate (with Menthol 5%). For analgesic effect in rheumatism.

It relieves pruritus and is suitable as an antiseptic Ointment. For muscular rheumatism of the limbs, which it cures (W.W.W.), it is best applied after fomenting the part with hot water.

Chloral Hydrate 1 to 5% has been suggested as an addition to creams of this kind. Oil of Cajuput is also used.

Linimentum Methyl Salicylatis, *Martindale.*

Methyl Salicylate 20, Menthol 10, Chloroform 10, Camphor 10, Eucalyptus Oil 10, Turpentine Oil 10, Lavender Oil 5, Liquid Paraffin to 100. For use similar to the above.

Opium Tincture or Belladonna Liniment 10 to 20% may be added if required, but they do not mix with the Salicylate Liniment.

Preparations designated "**Betulol,**" "**Linimentum Betulæ Compositum,**" and **Baume Analgesique,** are supplied.

***Menthofax** (T.M. 405840).

A combination of analgesic, local-anæsthetic, and counter-irritant substances.

Balmosa.—A non-greasy, analgesic cream, containing Methyl Salicylate and rubefacients.

Unguentum Acidi Salicylici Terebinthinatum—Salicylic Acid 1, Oil of Turpentine 1, Lanolin 1.

The above are of value in rheumatic affections, applied to joints on lint covered with guttapercha tissue and flannel bandage.

Ethyl Salicylate. *Syn.* ETHYL ORTHO-HYDROXY-BENZOATE $C_6H_4.OH.COOC_2H_5=166{\cdot}083$.

A colourless liquid of aromatic odour, with Sp. Gr. 1·13 and B.Pt. 225—234°, and properties similar to the Methyl compound. Soluble in alcohol.

Amyl Salicylate. $C_6H_4.OH.COO.C_5H_{11}=208{\cdot}1248$.

Substitute for Methyl Salicylate, with much less odour. For painting on to rheumatic joints.

Capsules of Amyl Salicylate contain 3 minims (0·2 Cc.) for internal medication.

BURNS especially from Acids—are well treated with a pad soaked in it—the part being first dried and then flooded with water and neutralised with dilute Quinidina.—Spencer, Chapman & Messel, Ltd.

Unguentum Amyl Salicylatis Compositum. *Syn.* **'Amysal.'**

Similar to Methysal Balm *q.v.* but made with Amyl Salicylate. Odour more pleasant.

Borneol Salicylate. *Syn.* ✱**Salit** (T.M. 258851). In muscular rheumatism and acute neuralgia, by inunction or by painting over affected part. Apply ½ to 1 drachm, with equal quantity of olive oil.

Salicyl Salicylate. *Syn.* ✱ **Diplosal** (T.M. 303704).

$OH.C_6H_4.COO.C_6H_4.COOH=258{\cdot}078$.

Dose.—15 grains (**1 Gm.**) in cachet or tablets.

Salol in which the phenyl group is replaced by Salicylic Acid. White odourless needles melting at 147° C. Insoluble in water and dilute acids, soluble in alcohol. Used for rheumatism, neuralgia, and cystitis.

Pharmacological experiments showed that the compound remained unchanged for 6 hours in the gastric juice, but was decomposed in 2 or 3 minutes in the duodenal secretion. Hence it does not cause gastric disturbances.

'Trichlorophenyl-Iodomethyl-Salicyl,' described as 'T.C.P.' A non-poisonous liquid preparation for local use to wounds and burns, in nasal catarrh, pyorrhœa and skin affections, for relief from the pain of bites and stings, and as a preventive against influenza and malaria. It is also used as a remedy for chilblains, piles and as a general antiseptic application.

Acidum Acetyl-Salicylicum (*B.P.* '14). *Syn.* **Aspirin.** FR. Cx., F.G. VI., P. Helv., P. Dan., P. Ital. V., U.S. X., P. Svec. X., F.E. VIII., P. Belg. IV. $CH_3CO.O.C_6H_4COOH=180{\cdot}0624$.

The Name Aspirin* is *public property.

For details of removal ('avoidance') of the Trade Mark from the British Register, and from the U.S. Patent Office, see Edn. XVIII.

✱ASPIRINOIDS, 284821 assoctd, is however, still on the British Register.

Acetosal, Acetysal, ✱Aspirgran (T.M. 457720), **✱Aspro** (T.M. 405787), **✱Empirin** (T.M. 364114), **✱Genasprin** (T.M. 380162), are further names for the substance.

PATENTS.—Nos. 27088 of 1898 and 9123 of 1899. Riedel's Patent is No. 11596/97. All these are now void.

For judgment in Patent case in this country see P.J. ii./05,76; ii./07,724.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets or suspended in a good draught of water thrice daily after meals—not on an empty stomach. Children ½ to 5 grains (**0·03 to 0·3 Gm.**). P. Ital. V. has 3 Gm. as max. dose in 24 hours. F.E. VIII. 5 Gm.

Manufacture.—By action of acetic anhydride on Salicylic Acid. Salicylic Acid 50 and Acetic Anhydride 75 are heated to 150° C. for two hours under a reflux condenser. On cooling, the crystals are pressed out and recrystallised from dry Chloroform. Alternatively Salicylic Acid 25 and Acetyl Chloride 20 are heated under a reflux condenser to 80° C. for

some hours. Excess of Acetyl Chloride is removed on the water bath and the product recrystallised from dry Chloroform, Benzene or Carbon Tetrachloride. *Consult also Patents above referred to.*

N. Evers, 'Chemistry of Drugs,' 1926, has data of large-scale production.

Characters.—A white powder, M. Pt. 133 to 135° C. (the latter in preference). It is not an absolutely stable body—all samples have more or less odour of Acetic Acid.

Soluble about 1 in 400 of water, 1 in 5 alcohol 90%, 1 in 17 of Chloroform, 1 in 15 of ether—by our experiments.

Incomplete solubility is caused sometimes by the use of benzene as recrystallising medium.—Prof. H. Llewellyn Smith.—P.J. i./15,200.

Aspirin passes (in great measure) unchanged through the stomach, decomposing to a great extent on reaching the alkaline intestinal juices.

Incompatible with free acids, iron salts and alkalis. It forms a clear mixture with Sodium Bicarbonate, owing to formation of Acetate and Salicylate of Sodium, and is not intended to be thus prescribed. Heating the acid in presence of moisture also causes dissociation. For Potassium Citrate in conjunction *v. postea.*

Acetic Acid is liberated on dissolving Aspirin in Liquor Ammoniæ Acetatis. The Acetic Acid then forms Ammonium Acetate and Salicylate.—P.J.i./30,184.

Ferric Chloride added to Solution produces no violet colour; distinction from and absence of Salicylic Acid. *For further details see Vol. II.*

Uses.—Has anti-rheumatic properties, and is used as a substitute for Salicylic Acid and its salts. Does not irritate the mucous membrane of the stomach, and is to be preferred in heart and ear complaints. Is useful in influenza (especially with Quinine), acute and chronic affections of the joints, headaches, and in gout, neuralgia, chorea, and pleurisy. Has been used in hay fever, diabetes and dysmenorrhœa. The gradual hydrolysis of the substance in the body is said to prevent the cumulative toxic action of the Salicylic Acid. It relieves the pain of cancer and of cystitis.

In influenzal complaints a dose taken at bed-time will often induce perspiration, quiet sleep follows, fever is reduced and pulse improves. In some cases, it is useful with Caffeine, *e.g.*, Aspirin 7½ grains with Caffeine 3 grains.

Physiological Action.—Our experiments have shewn that in passing through the stomach Aspirin splits up to an extent not exceeding 5% of the amount taken, the bulk of the acid being absorbed as salicylate in the intestines after hydrolysis.

Prof. H. Llewellyn Smith went over similar ground with numerous samples and confirmed our results.—P.J. i./15,200.

Elimination of Salicylic Acid and of unchanged Aspirin. A paper by P. J. Hanzlik and E. Presho in the Journal of Pharmacology and Experimental Therapeutics, May, 1923, embodying some results obtained *in vitro* and an investigation of the urine of 6 patients, 4 of them being convalescents and the remaining 2 suffering with rheumatic fever, was apparently written to upset existing beliefs as to the fate of Aspirin in passing through the system. So far as the *in vitro* experiments go, the results confirm our own investigations which have been published for some years, *i.e.*, the amount of decomposition depends on the time in solution at body temperature.

With regard to the clinical results, the total of Salicylic Acid and unchanged Aspirin, which was found to have been passed, varied considerably in the

various cases, for example, in one case, 68·5% of the total Salicylic Acid and Aspirin was excreted, while in another case only 27% was excreted. It should also be made clear that the dosage was heroic and, intentionally, bordering on the toxic. The paper says that with ordinary doses, ½ to 1 Gm. of Aspirin, no data are at hand, but that with doses of this magnitude the mean excretion of total Salicylic Acid in 3 normal individuals was about 60%.

The main point of the paper appears to be that in the 6 persons referred to, *receiving toxic doses* of Aspirin, there was a total excretion of unchanged Aspirin ranging from 8·8% to 36·6% of the Aspirin taken, and, broadly speaking, that a considerable amount of unchanged Aspirin would circulate through the body in such cases. The investigation is of interest, but the conditions do not seem to be in agreement with ordinary therapeutic developments.

For *further details, also for* ***Bactericidal Action,*** *vide* Vol. II.

Mistura Aspirin. *Syn.* MISTURA ACIDI ACETYL-SALICYLICI.

Dose.—½ ounce = 10 grains.

Aspirin in fine powder 10 grains, Tragacanth Mucilage 90 minims, Chloroform Water to ½ ounce.

Mistura Aspirin et Potassii Citratis.

Dose.—Half an ounce (**15 Cc.**) with a little water.

Aspirin 2 drachms, Potassium Citrate 4 drachms, water to 6 ounces. This forms a clear solution. To be prepared without heat. Not to be kept more than a few days—actually, the Aspirin is hydrolised in proportion to time.

In influenza the alkaline effect of the Potassium Citrate is beneficial.

Potassium Citrate with Aspirin.—Aspirin in presence of Potassium Citrate has its solubility in water markedly increased.

We made some experiments on the subject in 1927. *The practical upshot was that to make Aspirin soluble approx. 1 in 20 it is necessary to prescribe nearly twice the amount of Potassium Citrate with it. The above mixture is the result of our investigations.*

There may be a notable difference in physiological effect, as apart from the independent action of the Potassium Citrate the speed and even the locus of absorption in the system may give enhanced effect. A larger proportion may perhaps be absorbed in the stomach, and in consequence less would be carried forward to the duodenum, where Aspirin alone is thought to be assimilated—*cf.* B.M.J. i./27,908.

The velocities of decomposition of Aspirin in the presence of Sodium Bicarbonate or Potassium Citrate are practically identical. 81% Aspirin was recovered in 18 hours and 69% after 3 days.—D. B. Dott, P.J. i./29,302,311, 355; i./30,214.

Aspirin Chewing Gum is made for producing local effect on the throat and tongue.

Aspirin Tablets are prepared weighing 5 grains (**0·3 Gm.**), and 8 grains (**0·5 Gm.**). These should *not be swallowed whole.*

Also **Tablets of Acetyl-Salicylic Acid** 5 grains **with Phenacetin** 2½ grains each and [℗1] [D] **with Dover's Powder** 2½ grains. If made **with Lactose** 5 grains in addition these are Ⓟ *but outside* [℗]. Prescribers should specify "*Form* 2."

Acute febrile diseases—measles, pneumonia, diphtheria and sepsis generally—treated by the following combined: Aspirin 10 grains, Phenacetin 5 grains, Compound Ipecacuanha Powder 15 grains, with striking effects. Inflammation reduced at site of origin, with sweating and fall of temperature.—R. J. G. Parnell and co-workers,

B.M.J. ii./22,1000. The combination is highly spoken of by others; valuable during the paroxysms of malaria, *ibid.*, p. 1097. *See also* L. ii./23,1422.

Dover's Powder, it is stated, should not be compounded with Aspirin, as in cases susceptible to Opium it retards the action of Aspirin and causes serious danger.—T. M. Allison, L.i./26,1280.

Pulvis Aspirin Compositus, *vel* "PULV. A.P.C."—VIC. PARK.

Aspirin 5 grains, Phenacetin 4 grains, Caffeine Citrate 3 grains.

Aspirin and Phenoquin—combined powders 7½ grains each, followed in the morning by a brisk Saline aperient, useful. Better than Aspirin alone in producing a profuse perspiration.—N.Y.M.Jl., Mar./20, 459, per Pres., Feb./21,85.

Pulvis Aspirin Quininæ et Amidopyrin. *Dose.*—10 grains (**0·6 Gm.**).

Aspirin 5 grains, Quinine Salicylate 2 grains, Amidopyrin 3 grains. Used extensively at U.C.H. for relief of post-operative pain, neuralgia, etc.—Communicated by Mr. Herbert Tilley.

Aspirin Tablets made with 1½ molecules of Sodium Bicarbonate to 1 molecule of Acid subject of a Patent.—P.J. i./13,768.

Magnesium Oxide has been added to Aspirin tablets to disguise taste.—P.J.ii./29,199.

Elixir Sodii Brom-Acetosalicylatis.

Dose.—½ ounce repeated each hour if necessary until 4 doses have been taken. Contains the equivalent of 10 grains of Aspirin and 10 grains of Sodium Bromide in 1 ounce.

Antipyretic. Relieves chronic articular rheumatism, and may be tried for vague neuralgic pain.—W. W. W.

℞ **Pilula Aspirin et Acidi Arseniosi (Hoedemaker's Pill).**—Vic. Park.

Aspirin 2½ drachms, Arsenious Anhydride 1/6 grain, Starch and Distilled Water sufficient to make into 100 pills. *Dose.*—2 pills thrice daily, increasing carefully by one pill every second day to a maximum, continued for a period, of never more than 25 pills daily, and then reducing at the same rate.

References to Aspirin.

ASTHMA. Some cases relieved by Aspirin. In others it is quite unsuited.—B.M.J.E.ii./22,33.

After TONSILLECTOMY an **Aspirin 'Throat Bath,'** 10 grains floating on a half tumbler of water, held in the throat, first one side and then the other, is soothing.—R. S. Stevenson, L.ii./25,1332.

SOPORIFIC EFFECT.—Aspirin often has this, probably by causing a dilatation of peripheral vessels.—'Insomnia,' E. M. Callender, L. ii./27,1282,1294.

Hirudicidal power of Aspirin. A child in Palestine with fever and blood spitting was treated with Aspirin. An hour after two leeches were emitted. Found good in dogs.—B. Salah, L. ii./29,750.

10 to 15 Aspirin tablets (5 grain) are frequently prescribed for one dose in some hospitals in the U.S.A.—P.J. i./30,354. Safety first in Gt. Britain.—*ibid.* 391.

Toxic Effects.

May occasionally cause gastric pain, vomiting and giddiness; œdema of face and skin rash.

RHEUMATIC PAINS IN THE ARM. 15 grains in three 5 grain doses during 4 to 5 hours. Within 20 minutes of the third dose marked œdema of the eyelids, forehead and cheeks suddenly developed. The œdema did not

disappear until the third day, and rheumatic pain ceased. Another patient experienced similar effect—5 grains caused puffiness of the eyelids.—P. H. Abercrombie, B.M.J. i./11,1314.

Cyanosis and rash after 10 grains of Aspirin—special idiosyncrasy.—W. A. E. Karunaratne.—B.M.J. ii./19,42.

Patients with low blood pressure and nasal polypi cannot take Aspirin. Phenacetin is usually safe.—A. Francis, *ibid.* 204, 560 and 694.

As a drug crave Aspirin may develop in the future.—Prof. Wild, L. ii./20,35.

485 grains of Aspirin taken in tablet form in one dose. Vomited copiously. Quick recovery—no active treatment adopted.—J. H. Robinson, L. ii./26,256.

Death of an infant after taking 2 dessertspoonsful of a solution containing 1,500 grains (300 5-grain tablets) of Aspirin in a pint of water, deliberately administered by the mother with intent to kill.—B.M.J. ii./29,128.

For further references see previous Edns.

Calcii Aceto-salicylas. *Syn.* ✱ **Tylcalsin** (T.M. 337714). *Martindale.* $(CH_3CO.O.C_6H_4.COO)_2Ca$ $(+2H_2O)=434{\cdot}2204$.

✱**Kalmopyrin** (T.M. 348371) has the same composition.

White amorphous, non-hygroscopic powder.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**) to be taken in a little water.

Solubility.—In water 1 in 6, but it dissociates in proportion to time and temperature in this form. It is preferably given in *tablet, crushed at the time of taking in water, or as a cachet, followed by a draught of water.*

Exposure to excessive temperatures.—Tylcalsin should not be heated, especially with moisture. Decomposition commences between 50° and 60° C.—W.H.M., Oct., 1921.

Incompatible with mineral acids and as other Lime Salts. Prescription in mixture form is *not advised.*

Tablets and Cachets 8 grains (**0·5 Gm.**) each are prepared.

Uses.—In view of its greater solubility, Tylcalsin forms a useful substitute for Aspirin. (Soluble medicaments pass rapidly into the intestine and are absorbed there.)

Attention may be drawn to the *intravenous* use of Tylcalsin *postea.*

A prompt rheumatic and influenza specific, in catarrhs and neuralgia, and for relief of pain. It combines the good qualities of Sodium Salicylate and Aspirin. It is well tolerated and has never been known to produce vomiting. May be tried in obstinate diarrhœa.

Antipyretic action occurs in about an hour, with drop of temperature of 0·4 to 0·8° C.—the fall being maintained for 2 to 2½ hours, then give further dose—for rheumatic gout pain. As analgesic one tablet suffices, two may be given if heart action is normal.

In lumbago 2 tablets at night in hot tea (as diaphoretic) valuable.

In gonorrhœal rheumatism, Tylcalsin has given excellent results.

It does not cause pharyngeal or gastric pain like the free acid and it occasions less renal irritation.—P.J. i./17,419.

ASTHMA well treated by Tylcalsin, ten grains three or four times a day. Calcium Lactate used for children.—A. M. Bremner, B.M.J. ii./22,666.

DENGUE has been well treated by Tylcalsin. In some cases relief commenced in half an hour.—R. B. Billimoria.

SEPTIC THROAT (Staphylo. and Streptococcal) treated with Tylcalsin internally and Tinctura Ananassæ locally. In less than 24 hours the symptoms had completely disappeared. Tylcalsin acted well in checking the incubation of the Cocci and reducing temperature rapidly.—Craik Taylor.

NEURITIS AND NEURALGIA.—Tylcalsin 5 grains, Quinine Salicylate 1 grain, Salol 5 grains and Phenalgin 10 grains, as a combined powder, has been found most efficient.

TYLCALSIN INTRAVENOUSLY.

For rheumatic and other types of pain, Tylcalsin intravenously was suggested.—A. Cambell, B.M.J. ii./21,37,774.

Dose.—The usual dose is 0·5 Gm. in 10 to 20 Cc. of water, but larger doses, even 2 Gm., have been administered. The concentration is of importance ; it should not exceed 5%.

Technique.—The contents of one Sterule are dissolved in 10 Cc. of previously boiled and cooled water, and injected *very slowly.* Solutions of Tylcalsin must not be heated.

Tylcalsin Sterules contain **0·5 Gm.** dry powder.

Tylcalsin is a delicate compound liable to hydrolysis on keeping. If there is evidence of marked acetous odour, or a ' puff ' on snapping off the Sterule, the chemical is unsuited for use.

Uses.—Successful in sciatica, acute rheumatism, tabes dorsalis, interstitial keratitis, acute iritis, gonorrhœal synovitis, dysmenorrhœa and severe headaches of doubtful causation.

Psoriasis of 15 years' standing was treated by the method, with " marvellous " result. The affection cleared up completely.

In obstinate influenza the procedure is worthy of trial.

In rheumatic endocarditis, we have been told, there is nothing equal to it. ¼-Gm. doses have been given to children of 14.

In acute and subacute rheumatism, and in septicæmia useful intravenously.—H. Pritchard, B.M.J. i./27,794.

Rapid results in rheumatic infections from Tylcalsin intravenously. —J. Burnford, L. i./31,351. (Not Calcium Salicylate, as stated).

✱ **Alasil** (T.M. 494545) **Tablets.**

Dose.—1 or 2 thrice daily in an ample supply of water.

Tablets contain Calcium Acetyl-Salicylate 7½ grains and Alocol (Colloidal Aluminium Hydroxide) 6 grains. Antipyretic, analgesic and sedative. In rheumatic affections, influenza, chills, neuralgia and cough. Well tolerated.

If free perspiration is desired 2 tablets should be stirred into a wineglassful of water and taken as a draught at bed-time, followed at once by a tumblerful of hot lemon-water, hot milk, or other hot beverage.

Lithii Aceto - Salicylas $CH_3CO.O.C_6H_4COOLi = 185·9946$. *Syn.* ✱**Tyllithin** (T.M. 337715). LITMOPYRIN is a similar compound.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). Maximum daily dose 75 grains (**5 Gm.**).

White powder with bitter taste. ***Soluble*** 1 in 1 in Water, 1 in 4 Alcohol, insoluble in Ether. The salt is to be kept in a well closed bottle as it undergoes decomposition in moist air.

Uses.—Analogous to those of the Calcium Salt (*antea*).

By reason of greater solubility, possesses advantage over Aspirin.

Incompatible with Iron Salts, Mineral Acids and Alkalis.

It is preferably given as **Cachets or Tyllithin Tablets,** 8 grains (**0·5 Gm.**) in each, the latter to be crushed and taken in a little water. It is *not desirable* to give it in mixture form.

Enema Sedativum St.G.H.

Lithium Aceto-Salicylate 10 grains, Sodium Bromide 1 drachm, Distilled Water to 5 ounces.

To be mixed with equal quantity of warm water and given immediately after operation.

Magnesii Aceto-Salicylas. *Syn.* ***Magisal** (T.M. 413697).
$(CH_3CO.O.C_6H_4.COO)_2Mg. = 382{\cdot}292.$
Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).
Microcrystalline powder, non-hygroscopic, almost tasteless and odourless, soluble 1 in 12 of water, less readily in spirit.

Incompatible with Iron Salts, Mineral Acids and Alkalis and otherwise as Aspirin Compounds.

Uses.—This is a relatively stable, Acetosalicylate which may be used as an alternative to the other salts and the acid.

PANNICULITIS.—If pain is severe or interferes with treatment, a cachet containing Magisal, Pyramidon and Caffeine Citrate may be given occasionally, otherwise drug treatment, apart from a digestive aid, is of doubtful value.—W. Bain, B.M.J. i./25,450.

***Magisal Tablets** 5 grains (**0·3 Gm.**).
Dose.—One to three tablets as required, to be crushed and taken in a little water.

Sodii Aceto-Salicylas, $CH_3CO.O.C_6H_4COO.Na = 202{\cdot}0516$. *Syn.* ***Tylnatrin** (T.M. 337716).
Dose.—5 to 15 grains (**0·3 to 1 Gm.**).
White amorphous hygroscopic powder, very soluble in water.

Uses.—Similar to Tylcalsin. Has also been given intravenously, but Tylcalsin is preferable.

Saligenin.—$C_6H_4CH_2OH.OH = 124{\cdot}0624$.
Dose.—10 grains (**0·6 Gm.**).
This is the Alcohol of which Salicylic Acid is the corresponding acid. It is converted into the acid in the body.
It is formed with Glucose on the hydrolysis of Salicin. In acute rheumatism it has been well spoken of by R. Stockman. *Further details, Edn. XIX, p.* 79.

Acetyl-methyl-Salicylate. *Syn.* SALACETOL.
$C_6H_4(OH).COO.CH_2CO.CH_3 = 194{\cdot}078$.
Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in cachets or suspended.
Manufacture.—By heating Sodium Salicylate with Monochlor-Acetone in equimolecular proportions, in shining crystals very slightly soluble in water, in alcohol 90% 1 in 14 easily. Caustic alkalis decompose it, forming salicylates.
Used in rheumatism. For diarrhœa best given in Castor Oil (if required) —before breakfast.

Salicinum (*B.P.* '14). U.S. $C_6H_{11}O_5.O.C_6H_4.CH_2OH = 286{\cdot}1404$.
Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, taste may be covered with liquid extract of liquorice, or small dose in a pill with glycerin of tragacanth.
A glucoside in colourless shining trimetric tabular crystals, without odour, taste moderately bitter. ***Soluble*** 1 in 28 parts of cold water, less in alcohol, but not soluble in ether. Obtained from *Salix fragilis* or *S. purpurea* and other species of willow. M. Pt. 200° C.

Uses.—Cures influenza and as a prophylactic. In acute rheumatism, large doses are specific. It is given to reduce fevers, *e.g.*, of malaria or phthisis. Is of value in psoriasis and in syphilis where Mercury is not tolerated. It is not adapted for use as an external antiseptic.

Effervescent Salicin.

Dose.—1 drachm. Contains 5 grains in 1 drachm.

Tablets, 5 grains of Salicin (**0·3 Gm.**). *Dose.*—1 to 4.

Its action depends on production of Salicylic Acid in the blood. In rheumatic fever it is highly satisfactory. 20 grain doses hourly or 30 grains every 2 or 3 hours. 60 grains have been given, repeated in 2 hours without ill effect.—R. Stockman.

In LUPUS ERYTHEMATOSUS with good results, 15 grains 3 times a day with saline aperient.—J. M. H. MacLeod, B.M.J. ii./13,313.

INFLUENZA.—Salicin, large doses effectual; 20 grains every hour for 12 hours followed by 20 grains every 2 hours for the next 12; also removes infectivity of patient.—E. B. Turner, B.M.J. ii./18,112; i./19,278.

Its value in Influenza—from 1889-1927.—E. B. Turner, B.M.J. ii./27,93; see also J. Craig, *ibid*, 237.

PSORIASIS.—Salicin, 10—15 grains three times a day a valuable drug in acute and spreading cases.—B.M.A. Ann. Meeting, '26, L. ii./26,550. *See also* G. Pernet, Arch. Derm. Syph., Jan. '26,111.

Iodo-Salicin, $C_{13}H_{17}IO_7+2H_2O$.

This compound, the author suggests, may prove a valuable anti-rheumatic and anti-influenza remedy. No data as to dosage are as yet available.

Salol (*B.P.*'14), P. Belg. IV., P. Ital. V., F.E. VIII, U.S.X., P.G. VI. *Syn.* **Phenyl Salicylate** $C_6H_4.OH.COO.C_6H_5=214·078$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets or suspended in milk. FR. CX. and P. BELG.: *Max. single dose,* 15 grains. **Max.** during 24 hours, 90 grains.

Small crystals, with a slight wintergreen odour. M. Pt. 42 to 43° C.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 3. **Pills** contain $2\frac{1}{2}$ grains. **Capsules** contain 5 and 10 grains (**0·3 and 0·6 Gm.**).

Soluble 1 in 10 or more of alcohol, 1 in 12 of liquid paraffin, in fixed oils, and a trace in glycerin. Almost insoluble in water.

Dispensing Note.—When prescribed in an emulsion with an oil, *e.g.*, Castor Oil, dissolve it in the oil before proceeding. Melt the Salol and the oil in a warmed mortar (salol melts about 42 to 43° C.); emulsify with tragacanth, using hot water to complete.

In the case of the following prescription, Salol 10 grains, Castor Oil 5 minims, Tragacanth Powder *q.s.*, Glycerin 10 minims and Water to one ounce, it is well to use Saponin. Place the Castor Oil, Salol and Glycerin in a mortar with half a grain of Saponin; triturate well together, then add gradually with continuous stirring half an ounce of mucilage of Tragacanth, and, finally, the requisite quantity of water. This method produces a fine, white non-separating emulsion.—A correspondent, C.D., Sept. 9, 1922.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Elixir Aromaticus, Syrupus Aurantii Floris.

Uses.—Antiseptic and antipyretic. In the small intestine it splits up into its component parts, both being found in the urine, which is rendered aseptic and becomes very dark. Used with success for rheumatism, acute and chronic, for sciatica, dysentery, and typhoid fever, gonorrhœa and vesical catarrh and diabetes. The dose is limited by its *phenol* content.—R. Stockman.

In all forms of sore throat; relieves earache and ocular neuralgia, and of value for summer diarrhœa, especially of children. Must not be given in renal disease.

In acute infection of the urinary tract and efficacious in infections due to colon bacillus. Total dose: 40 to 45 grains in 24 hours, given in 7½ grain cachets with a warm drink, or at meal times.—B.M.J.E. i./27,12.

In diagnosis of fermentative Indigestion :—

The time taken for the food to leave the stomach may be found by giving 15 grains of Salol. This does not undergo decomposition in acid, but in an alkaline medium is split up into constituents, phenol and salicylic acid. The presence of the latter is readily found in the urine by adding a little neutral Ferric Chloride solution. One may expect to find it normally in from 45 *to* 75 *minutes after Salol is taken.*—B.M.J. i./11,665.

Cachets of Salol, Bismuth Carbonate and **Sodium Bicarbonate,** 5 grains each are useful as intestinal antiseptic.

Salol Mouth Wash.

Salol 2·5, Saccharin 0·004, Peppermint Oil 0·5, Clove and Caraway Oil of each 0·1, in Alcohol 80%, to 100. *For use* dilute in proportion ½ to 1 teaspoonful to the ½ pint of warm water.

Emulsio Salol. *Dose.*—½ to 1 ounce.

Salol 20 grains, Compound Tragacanth Powder 20 grains, Distilled Water *q.s.* to 1 ounce.

CHOLERA.—During the algide stage the following mixtures have been used :—Salol 10 grains, Mucilage 1 drachm, Spirit of Chloroform 15 minims, Water 1 ounce—every 2 hours until reaction sets in—then Sodium Bicarbonate 10 grains, Spirit of Chloroform 20 minims, Sweet Spirits of Nitre 20 minims, Water to 2 drachms, every four hours till urinary secretion is established and normal. May be combined with 2 or 3 quart intravenous injections of warm Sodium Chloride Solution (100 grains to the quart). This injection is made by gravity (2 or 3 feet head of water), and may be repeated.—Brooke.

Salol Coating of Pills is conducted by employing Salol *melted*.

This renders the pill insoluble in the acid gastric juice, but soluble in the alkaline fluid of the intestine; hence suitable for purgatives to act on the bowels, and for administering antiseptics in eczema and urticaria—*cf.* **Pilulæ.**

Collodium Salol. Salol 4, Ether 4, Collodion 30. Gives relief in pain of acute rheumatism.

Pigmentum Salol, Mid. H., 1927.

Salol 1, Glycerin 4, Alcohol (90%) 15.

Salol Catheter Oil. Salol 1, Castor Oil and Almond Oil, of each 15. Does not dissolve the varnish of catheters.

Salol cum Camphora, Salol Camphor.

Salol 3, Camphor 2, heated together, combine to form a viscid liquid, which has been used as an antiseptic in place of iodoform. Prepared with 10% only of camphor, quickly crystallizes, and when powdered is suitable for application, where liquid not practicable.

Useful in suppuration of the middle ear; non-irritating.

℞ **Unguentum Salol cum Cocaina.**

Salol 2, Cocaine Hydrochloride 1, Ceratum Petrolei 16, for burns.

Unguentum Salol cum Menthol.

Salol 4, Menthol 2, Olive Oil 4, Anhydrous Lanolin to 100. For fissures of the skin, *e.g.*, in chapped hands.

***Aspriodine** (T.M. No. 435198). *Syn.* ACETYL-IODO-SALICYLIC ACID. $C_6H_3I.O.CH_3CO.COOH=305·9866$.

Dose.—5 grains (**0·3 Gm.**) per diem after food, increased if required. To be given *alone* in tablet (crushed) or in cachet or slipule (No. 1), followed by a little water.

Chemical Composition.—Aspriodine is a definite compound containing 41·47% *Iodine*, the balance (58·53%) being the *Aspirin* radical. It is stable at ordinary atmospheric temperatures. It has M.pt. 154°.

Soluble in Alcohol 90% 1 in 16·5, Ether 1 in 22, Chloroform 1 in 57, very slightly in Water (1 in 5,500).

Incompatible with Alkalis; preferably administered alone.

Pharmacology.—Aspriodine embodies the properties of Iodides on the one hand and Aspirin on the other. It is not affected by physiological acid, but it is readily split up by the alkalinity of the intestinal digestive tract.

Evidence of liberation of Iodine in the body. Examinations of the urine after taking, for example, 10 grain doses of Aspriodine by the mouth have shown that the Iodine is promptly liberated in the system—within an hour. The Iodine in these instances is associated with inorganic bases, Sodium or Potassium. The result is of peculiar interest, because Iodine in the ***Benzene ring of an aromatic compound is generally strongly held*** and difficult to remove chemically as, for example, by simply treating it with an aqueous solution of an alkali. We repeat there is therefore distinct evidence that the compound is dissociated, possibly in part by enzyme action, in the alkaline portion of the duodenum.

Method Employed in Testing the Urine. Possible confusion with Iodine in the organic condition was excluded by treating the specimens with Ether after acidifying to remove any compound of the nature of Iodo-Salicylic Acid, which it is assumed, would be formed in the first stage of dissociation. The procedure employed was to acidify a small amount, *e.g.*, 30 Cc., of the urine from the total output and extract it with Ether, as stated, by repeated shaking, then to render alkaline with Caustic Soda, evaporate to dryness and incinerate. The residue was dissolved in 10 Cc. of water and, after filtering, a small quantity of Sodium Nitrite and Sulphuric Acid were added in the presence of a little Chloroform. The Iodine passed into the Chloroform with the customary colour. (This method is preferable to the use of Chlorine Water.)

It is of interest to remark that a rheumatic sufferer had to take 10 grains 3 times a day after meals for 3 days before the Iodine was found in his urine, whilst a normal individual gave evidence of Iodine, as stated, in an hour after taking the dose.

It is noticed also that the urine of some individuals becomes promptly cloudy owing to an increased elimination of Uric Acid. The point is of value from the clinical aspect to those who still hold to the Uric Acid theory of rheumatic affections.

Uses.—Small continued doses have been used for rheumatic affections and in arteriosclerosis with benefit.

Aspriodine may also be of value in asthma and in many other affections, where Iodides have proved beneficial, *e.g.*, in scrofula and for enlarged glands and wherever small continued doses of the two constituents are desired. The substance has pronounced antiseptic powers and is well tolerated.

Aspriodine Tablets, Cachets and Slipules 5 grains (0·3 Gm.) are prepared.

Sodium-Aspriodine, Lithium-Aspriodine, Calcium-Aspriodine and **Magnesium-Aspriodine** have been prepared. These are also definite stable bodies which are new to medicine.

***Sedasprin** (T.M. No. 435197). *Syn.* ACETYL-BROMO-SALICYLIC ACID. $C_6H_3Br.O.CH_3CO.COOH$=258·9706.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) afford a mild sedative effect. The dose should be given preferably alone in tablet (crushed), slipule (No. 1 for 5 grains), or cachet form, with water.

Chemical Composition.—Sedasprin is a definite compound, containing 30·86% *Bromine*, the balance (69·14%) being the *Aspirin* radical. It was apparently first made by Robertson (J.C.S.T. 81, [1902], p. 1482), but it has not been used medicinally until introduced by the author (1923). In common with Aspriodine, this Bromine analogue is stable at ordinary temperatures. It has M.Pt. 136° C.

Soluble in Chloroform 1 in 11·5, Ether 1 in 4, slightly in Benzol, in Absolute Alcohol 1 in 10; in Alcohol 90% 1 in 4; slightly in water (1 in 1500).

Incompatible with alkalis. It is best given uncombined with other medicaments.

Pharmacology and Uses.—The process of absorption of Sedasprin is analogous with that of Aspriodine. Clinically the effect of Sedasprin is distinct from that of Aspirin. It combines the anti-rheumatic, anti-neuralgic and febrifuge properties of Aspirin with the sedative and hypnotic powers of a Bromide.

It has been suggested for use in all forms of nerve trouble, many types of headache, dysmenorrhœa, asthma, chorea, epilepsy, fevers, influenza, insomnia, laryngitis, neuralgia, sea-sickness and tonsillitis; in general, in cases where the combined qualities of Aspirin and Bromide are indicated. In chronic bronchitis, given at night as required, it has given relief.

Neuralgic pains not affected by Aspirin were instantly relieved by Sedasprin.—Major G. W. Vincent, 24/9/26.

Sedasprin Tablets, Cachets and **Slipules**, 5 grains (**0·3 Gm.**), are prepared.

Sodium-Sedasprin, Lithium-Sedasprin, Calcium-Sedasprin and **Magnesium-Sedasprin** have in addition been made. They are definite compounds, new to medicine.

Liberation of Bromine from Sedasprin in the System.

Although in the case of Aspriodine, inorganically combined Iodine can readily be shown in the urine shortly after taking a small dose of the compound, the demonstration of Bromine after taking a dose of the Bromine analogue is not easy because the Bromine is *absorbed*. Examination of the urine and fæces, even subsequent to taking a dose of Potassium or Sodium Bromide, shows that elimination is very slow.—*Details*, Edn. XIX, p. 85.

Urine Examinations after taking various Bromine Compounds (Sedasprin, Adalin and Potassium Bromide), see Vol. II.

Methyl-Aspriodine. *Syn.* METHYL-IODO-ASPIRINATE, METHYL-ACETYL-IODO-SALICYLATE. (*Aspriodine is a Reg. T.M.).

$C_6H_3I.O.CH_3CO.COOCH_3$=320·0022.

Chemical Characters.—Methyl-Aspriodine forms white crystals in small agglomerated granules with the interesting characteristic of melting at body temperature, 40° C. (104° F.), to a light yellow liquid with Sp. Gr. 1·6. In temperate climates it is therefore

solid or waxy, while in tropical climates it will be liquid. In either form it is practically odourless ; its taste is aromatic and pungent. It contains the equivalent of 56·3% *Aspirin and* 39·7% *Iodine.*

Solubility.—It is readily soluble in all the usual organic solvents, *e.g.*, Ether, Chloroform, Alcohol, and it is miscible with Olive and Almond Oils in all proportions. It is also soluble 1 in 50 in a mixture of 40% Alcohol in Glycerin. It is insoluble in water or plain Glycerin and is not miscible with Liquid Paraffin.

Uses.—In painful rheumatic joint affections, neuritis, sciatica, lumbago, sprains, headache, and broadly speaking as a prompt general local analgesic, Methyl-Aspriodine, as such, or as Balm or Liniment, is advised. (For inflamed areas, *e.g.*, enlarged glands, very light application of the Liniment or Balm may be tried.) Some cases in which the compound has been successfully used are mentioned on p. 81.

The parent substance, Aspriodine ($C_6H_3I.O.CH_3.CO.COOH$), introduced by the writer in 1923, has been proved of value *per os* in combating rheumatic affections and in a large variety of conditions where the combined effects of Aspirin and Iodine are requisite.

Following up the chemistry and pharmacology of the Halogenised Aspirin derivatives, on which the author has been at work for years, an attempt was made to modify Aspriodine in such a way as to produce a compound suitable for inunction. Methyl-Aspriodine resulted in 1926.

Methyl-Aspriodine permits of the local use of considerable doses of Aspirin and Iodine conjointly. Alternatively, one may view its use as the combined employment of Acetylated Methyl-Salicylate and Iodine. Logically, one may suggest that as Aspirin is a more effective anti-rheumatic than the parent Salicylic Acid, Methyl-Acetyl-Salicylate may be more reactive than ordinary Methyl-Salicylate (*Oleum Gaultheriæ*). The high percentage of Iodine is an additional argument in favour of the compound.

Directions.—*5 to* 20 *grains* (0·3 to 1·2 Gm.), *or, if liquid,* 7 *to* 30 *drops may be lightly rubbed into the affected part.* Upwards of 5 grains of Methyl-Aspriodine will 'lie on a sixpence,' and 20 grains 'on a shilling.' A small quantity almost completely disappears when rubbed into a few square inches of body surface. The Balm or Liniment *infra are preferably prescribed.*

A potent preparation of this kind is not intended to be vigorously rubbed into an extensive tender or inflamed area. The writer has information of dermatitis caused by a patient making too vigorous use of the substance (in the pure condition), *viz.*, rubbing it into the shoulder for eight successive days. The dermatitis completely cleared after treatment with Calamine Lotion : the arthritic pain also disappeared.

Apart from two cases of dermatitis, *no other adverse reports* have been brought to the notice of the author. Some local reaction may even be salutary in obstinate cases. Intermittent rather than daily use may be recommended.

There is initially a slight warming or tingling sensation, or in some cases a mild local anæsthetic effect.

Mucous Membranes.—Originally, it was thought desirable to direct that Methyl-Aspriodine should not be used to the mucous membrane. It has, however, since been employed in neuralgic affections of the gums. See Methyl-Aspriodine Pigment, *postea*.

In addition to the pure substance, the following are prepared:

Methyl-Aspriodine Balm, containing 50% in a Lanolin basis. This may be preferred by some patients.

Directions.—5 to 30 grains (0·3 to 2 Gm.) to be lightly applied.

Methyl-Aspriodine Liniment.—This contains 20% of Methyl-Aspriodine, in conjunction with Camphor, Chloroform, and Menthol.

Directions.—A small quantity to be lightly rubbed into the part.

Methyl-Aspriodine Pigment.—A 2% solution in an Alcohol and Glycerin solvent. Suitable for inflamed gums. The taste is somewhat comparable with that of Glycerole of Tannin.

Pharmacology.—On inunction of suggested therapeutic doses into the body, neither the Iodine nor the Salicylic radical could be readily traced in the urine, but this negative result is of interest. The urine was tested for Iodine by the method described under Aspriodine. Similar negative data are obtained with a large number of drugs used locally.

We recalled the interesting work of Prof. R. B. Wild and Miss Ivy Roberts (B.M.J. i./26,1076) with Mercurial preparations (see Ung. Hydrarg.). They found, *inter alia*, that 4 Gm. of Mercury Ointment (B.P. '14) gave an absorption into the body of 0·12 Gm. Mercury when used for 2 minutes and 0·17 Gm. in 10 minutes.

Prof. Wild, however, was not able to investigate the urine of normal persons who received the rubbings; we do not recall any systematic examination of the urine of persons so treated.

It seemed of interest to carry Prof. Wild's work a stage further, weighing the non-absorbed quantities and examining the urine for Mercury and other well-known medicaments (as tried) that are used locally and are known to be efficacious.

A resumé of our findings is in Edn. XIX

In no instance could the active constituent of these ointments be traced in the urine during the same day. The specimens were evaporated and examined by delicate analytical methods.

It was shown that a number of chemicals, *e.g.*, the potent Mercurials, of known efficacy in divers complaints, when rubbed into the skin, cannot be traced promptly as having passed through the system.

We note further that Prof. A. J. Clark in "Applied Pharmacology" gives a graph relative to work by Lomholt, showing that a few mgr. of Mercury could be found in the urine after daily rubbings for six weeks with large amounts (3 Gm.) of 50% Ung. Hydrarg., *i.e.*, the bulk of the Mercury is absorbed into the body, probably as a fatty acid compound.

In order that a drug may be absorbed, as explained by Prof. W. E. Dixon ('Manual of Pharmacology'), it must pass through either a sebaceous or sweat gland, since absorption through the horny epithelium is impossible. The cutaneous glands are filled with fatty material to which water is impervious, so that a drug

be absorbed, must be dissolved either in fatty substances or lcohol, all of which find their way thrcugh the fat.

Methyl-Aspriodine being soluble in fats, fulfils these requirements.

Internal administration.—Doses of 5 to 10 grains of lethyl-Aspriodine are suitable for use *per os*, and Iodine has been etected in the urine within 2 hours of taking a 5-grain dose.

Obstinate cases which fail to respond adequately to the compound mployed locally may be treated with the substance by the mouth, r indeed by a combined medication.

Methyl-Aspriodine Capsules containing 5 and 10 grains (0·3 and 6 Gm.) are prepared.

Methyl-Aspriodine Injection.—Methyl-Aspriodine (in suitable lute form) may, we believe, be used intramuscularly.

ecent Pharmacological Investigation (1931).

Two solutions were employed: (*A*) 10% Methyl-Aspriodine in live Oil; (*B*) the same with the addition of 3% Anæsthesin.

These were injected subcutaneously over the flanks into mice and ito a rabbit and the animals were closely observed for signs of in- ammation during two days.

Injection A.—No ill effect was observed in three mice receiving Cc. ($\frac{1}{2}$ Cc. into each flank). After 6 hours one of the mice was killed id examined. The injection had not been completely absorbed but iere was no inflammation. After 24 hours a second mouse was lled and examined. Absorption was nearly complete and no flammation. After 48 hours the third mouse was killed and xamined. The oil was completely absorbed without inflammation.

Injection B.—Effects were exactly similar to those from *A* on a rther three mice.

Tests on Rabbit.—A rabbit weighing 400 Gm. received 1 Cc. of *A*. one flank and 1 Cc. of *B*. in the other. No tenderness or induration as observed during 24 hours.

From these data the opinion is expressed that even without the ldition of the local anæsthetic Anæsthesin, 1 *Cc. doses of* 10% *lethyl Aspriodine could safely be given subcutaneously.*

The writer has received numerous expressions of opinion on Methyl- spriodine:—

RHEUMATISM.—Methyl-Aspriodine, also the liniment, and balm, have been sed in about 100 cases and have given better results than any similar com- ound for local use. A suitable preparation for the type of disability treated i this country.—Vincent Coates, 1927.

In chronic rheumatism (29 years) of great value.—A.M.R.

FIBROSITIS.—Methyl-Aspriodine as a routine treatment was found to be uch more successful in rheumatic affections than Methyl Salicylate.— A. J. Lennane, 1927.

Ite relieves pain and in the limited number of cases treated it was con- idered to be the best local application.—J. A. Venning, 1927.

SCIATICA, LUMBAGO, RHEUMATISM, SPRAINS, ETC.—In the relief of pain xcellent results were obtained with the ointment and liniment.—H. D. J. azarus, 1927.

Found of benefit in a case of sciatica.—G. E. W. Henderson, 1927.

STRAINED TENDONS.—In two cases which were of old standing and had ot yielded to ionisation or massage, improvement followed the use of Methyl- spriodine.

Methyl-Sedasprin the analogous derivative of Sedasprin, has also been prepared. A yellow oily product, which does not solidify above 0° C. Has been rubbed on the skin experimentally.

Phenyl-Aspriodine. *Syn.* ACETYL-IODO-SALOL.

(**The name Aspriodine is a Registered Trade Mark.*)

$$C_6H_2I\begin{cases}O.OC.CH_3\\ \\ COO.C_6H_5\end{cases} = 382{\cdot}0176.$$

Dose.—5 grains (**0·3 Gm.**) in tablet (crushed), cachet or slipule, with a little water. The dose may be cautiously increased. It should be given *as such*, not admixed with other chemicals.

This body, which is new to medicine, is also the outcome of the author's work on compounds of the nature of halogenised Aspirin.

The compound is obtained as a white, crystalline powder of neutral reaction containing 33·22% of Iodine. The phenyl radical in it is equivalent to 24·6% approximately of Phenol. It is a stable body giving practically no colour with Ferric Chloride. It has M.Pt. 123° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 250. Insoluble in water.

Pharmacology and Uses.—Phenyl-Aspriodine embodies the therapeutic effects of Iodine, Aspirin and Phenol. The Salol principle is involved. The ester passes unaltered through the stomach, to be split up by the alkalinity and saponifying enzymes of the intestines. The constituents are then slowly absorbed.

Urine contains Iodine and Salicylate after a dose.

A dose of 5 grains was taken and the urine examined after 3, 10 and 17 hours. Both Iodine and Salicylate were found in all the samples, even using 10 Cc. For the Iodine the E.P. Sodium Nitrite Process was used, and for the Salicylate Self's Vanadate Reaction.

Bactericidal Power in Vivo.—The urine of a normal individual added to broth grew. 1 hour after taking 5 grains the urine was sterile, but not so 2 hours after.

The dose of the substance is, in great measure, dependent on the Phenol content. This should be borne in mind, to prevent too potent effect.

It should supersede Salol in some instances as the antiseptic power of the compound is enhanced by its high Iodine content.

The special claim of this drug is as an intestinal and urinary antiseptic. In 5 grain doses it causes slight darkening of the urine. Phenyl-Aspriodine may prove effective in typhoid and dysentery and in gonorrhœa. It should further be tried in rheumatic affections, neuralgia and in arteriosclerosis.

Contraindication.—It should not be given in kidney disease.

Phenyl-Aspriodine Tablets, Cachets and Slipules, 5 grains (0·3 Gm.) each are prepared. **No. 1 slipule holds 5 grains.**

henyl-Sedasprin. *Syn.* ACETYL-BROMO-SALOL.
(**The name Sedasprin is a Registered Trade Mark.*)

$$C_6H_3Br\begin{cases}O.OC.CH_3\\ \\ COO.C_6H_5\end{cases} = 335{\cdot}0018.$$

Dose.—5 grains (**0·3 Gm.**) carefully increased if desired. It is referably given *as such* in tablet (previously crushed) or in cachet r slipule (No. 1 holds 5 grains), with a little water.

This compound is the Bromine analogue of Phenyl-Aspriodine. t introduces the Salol principle to the halogenised Aspirins, which ave already been considerably employed in medicine.

Phenyl-Sedasprin is in white crystalline masses of neutral reaction ontaining 23·85% Bromine. The phenyl radical present is equiva- nt to 28% approximately of Phenol. It is stable at ordinary emperatures and gives practically no colour with Ferric hloride (absence of Salicylic Acid and Bromo-Salol). It has M.Pt. 18° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 380. Insoluble n water.

Pharmacology and Uses.—Phenyl-Sedasprin embodies he activities of Bromine, Asprin and Phenol. It resists physio- ogical acid but readily splits up in presence of physiological alkali t body temperature. Care should be taken to avoid over-dosage. The dose is limited to the equivalent content of Phenol. The ompound should possess advantages over ordinary Salol as an ntiseptic and antipyretic. It has especially antiseptic action on he urine, which is slightly *darkened in colour* after a dose of 5 grains. t is advanced for treatment of rheumatic affections, neuralgia, evers, tonsillitis, laryngitis and particularly as a bactericide with edative effect in urinary affections.

Contraindication.—It should not be given in renal disease.

Phenyl-Sedasprin Tablets, Cachets and Slipules, 5 grains **0·3 Gm.**) each, are prepared.

mmonium Ortho-iodoxybenzoate. *Syn.* AMIODOXYL BENZOATE, *ARTHRYTIN (T.M. 486610) $C_6H_4(IO_2).COONH_4 = 297{\cdot}0024$.

A white crystalline powder, containing 42·7% of Iodine, readily soluble n water. To avoid decomposition, it should be kept dry and away from unlight.

Dose.—11 to 15 grains (**0·75 to 1 Gm.**) intravenously, or twice this dose rally.

Uses.—Chiefly in arthritis, especially active infection. It is given n 100 Cc. of Normal Saline intravenously within 7 to 12 minutes, but rally and in 2 Gm. doses by high enema it has been found effective. Following ntravenous use, reactions resembling non-specific protein reactions may ccur. The salt is quickly reduced in the blood stream, and it is stated to timulate phagocytosis of streptococci and staphylococci by human leuco- ytes.—Jl. A.M.A. ii./27,1061.

cetyl-para-amido-Salol. *Salophen. (T.M. 322560) P. BELG., HELV., SVEC., PH. NED. V., F.E. VIII., P. ITAL. V.

$C_6H_4\,OH.COO.C_6H_4NH.COCH_3 = 271{\cdot}1094$.

PATENT 11,833/1891 and 3435/1892, both now lapsed.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) 3 or 4 times a day in cachets.

Tablets, 5 grains, are prepared.

White crystalline scales, tasteless; soluble in alcohol, ether, and alkalis, almost insoluble in water. It contains about 50% salicylic acid. ***Incompatible*** with Alkalis and their carbonates. It is unaffected by gastric juice, but decomposed by pancreatic ferment. Anti-febrile and anti-rheumatic. Used in chorea, neuralgia, sciatica, headache, and throat affections. Ointment 10% in Lanolin for psoriasis and other skin affections.

ACIDUM STEARICUM, U.S., P.Jap.

Stearinum, P. Austr. *Commercial Syn.* "Stearine" wrongly so called. $C_{17}H_{35}COOH=284{\cdot}2808$.

This monobasic acid occurs as a hard white solid substance and is not entirely pure. It is prepared by decomposition with superheated steam of Stearin (the triglyceride of stearic acid contained with those of palmitic and oleic acids in tallow). ***Soluble*** about 1 in 18 of alcohol 90%. Readily soluble in ether.

Melts at about 56° C. (132·8° F.) (U.S.). This melting point corresponds to a mixture of 40% stearic acid and 60% palmitic. A melting point of 58° C. (136·4° F.) would be better for some suppositories. *Vide* Glycerin.

It is obtainable commercially with M. Pts. 50° C. (122° F.), 52·5° C. (126° F.), and 56° C. (132·8° F.). The pure acid melts at 69·2° C.

Commercially it contains 20 to 30% oleic acid. Iodine No. 21·7 would indicate about 24%. Pure stearic acid would of course have Iodine No. *nil*, which condition of purity may be approached by successive re-crystallisations from alcohol.

Cocoa-nut Stearine.—A white firm fat melting at 84° F. (29° C.) suggested for use as suppository basis, as having a melting point somewhat lower than cacao butter. It is obtained by chilling and pressing **Oil of Coconut** (Cocoa-nut Oil or Cocoa-nut Butter, **Oleum Cocos**, P.G. II.), *i.e.*, the oil or butter from the *Cocoanut Palm, Cocos Nucifera* Linné, hence to be distinguished from the product called Cocoa Butter (Oleum Theobromatis, *q.v.*). Oil of cocoanut is solid between 40° and 50° F., and liquid at about 80° F., and has characteristic odour. It is used as a substitute for lard and largely in soap manufacture. The dried pulp of the Cocoanut is known as **Copra**. The endocarp or meat of the nut is said to be a powerful tænicide. The patient should drink the milk and then eat the flesh of the nut.—U.S.D.

Cocoa-nut Oil has usually very low Iodine number—about 8. The oil from the *rind*, however, gives as high as 25 or 40.

Cocoa-nut Oil Soap. This, according to Lewkowitsch (quoted in Thorpe's Dictionary), can be prepared by a simple cold process, not requiring anything in the nature of boiling. To the fat, previously warmed to about 35° C., an accurately measured quantity of Caustic Soda Sp. Gr. 1·35 (*i.e.*, 32%) is added with stirring. (Use approx. 2¾ of this lye to 5 of Oil. This will saponify with slight heating.) The mass is allowed to stand and becomes warm, and saponification is effected in 24 hours. The soap is not 'salted out,' that is, it contains the Glycerin formed.

For making a Cocoa-nut Shampoo the following is suggested:—

Dissolve Sodium Hydroxide and Potassium Hydroxide, of each 1 part, in 5 parts of Distilled Water and when cold add spirit 5 parts; melt Cocoa-nut Oil 10 parts, and when this is nearly cooled to the congealing point add

gradually to the alkaline solution with shaking. Continue shaking occasionally for 10 to 20 minutes; finally add water enough to make 50. The preparation is alkaline, and can be neutralised with a little Oleic Acid. Terpineol and Coumarin are suitable perfumes.—C. & D., Oct./1920, p. 1426. *Further Suggestions, see Edn. XIX, Vol. I, p.* 92.

ACIDUM SULPHURICUM.

Syn. OIL OF VITRIOL. H_2SO_4=98·0756.

'*Poisonous.—Not to be taken*'—*For further conditions of sale v.* p. . *Dose.*—1 to 2 minims (**0·06 to 0·12 Cc.**).

With Sp. Gr. 1·843 contains 98% by weight of hydrogen sulphate. P. '14.—Sp. Gr. 1·841, *i.e.* 95%.

"Contact Process" of manufacture.—A mixture of Sulphur oxide and Oxygen is passed over finely divided Platinum or Oxide of Iron which acts as catalytic agent, causing union of the gases. By dissolving the Sulphur Trioxide thus formed in water, Sulphuric Acid is obtained.

Use.—Very occasionally as caustic.

Pruritus has been treated by internal use of, even when alkalinuria is absent. Dose, 1 tablespoonful every 2 hours of 1½ to 2½% solution. The itching is said to disappear rapidly.

Antidotes.—Magnesia and *cf.* Acidum Hydrochloricum.

Sulphuric Acid "Arsenic-free" is specially prepared to stand the Marsh-Berzelius Test 1 hour.

Acidum Sulphuricum Aromaticum (*B.P.* '14). *Syn.* ELIXIR OF VITRIOL. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**).

This contains a small amount of (aromatic) ethylsulphuric acid. It would be improved by carefully heating the mixture of acid and alcohol to encourage the formation of the vinous acid. Contains 2·9% *w/v.* of hydrogen sulphate, and has Sp. Gr. 0·917 to 0·923.

Acidum Sulphuricum Dilutum. (*B.P.*' 14). Sp. Gr. 1·069.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains 10% as also U.S., FR. CX., F. NORSK., F.E. VIII. and H. HELV., PH. NED. V. is 4 × N., *i.e.*, 19·6%, P.G. VI. 15·6 to 16·3%, H. ITAL. V. approx. 19%; P. BELG. approx. 9.8%.

Sp. Gr. and % Tables.—See Vol. II.

Carbuncles, boils, staphylococcic infections and certain streptococcic infections have been treated by internal use of Dilute Sulphuric Acid—20 to 30 minim doses with 2 or 3 ounces of water every 4 hours (small doses in carbuncle are no use).—J. and R. J. Reynolds, L., March 15,'13. Externally, 1 in 20 Carbolised Vaseline. Cases of bronchiectasis and pulmonary tuberculosis where there is often a staphylococcic infection have also benefited.

It has been given for prophylaxis and treatment in puerperal fever.

Incompatible with alkalis and carbonates. It precipitates barium and calcium from solutions of their salts, also soluble lead and silver salts.

Acidum Sulphuricum Fumans. *Syn.* NORDHAUSEN SULPHURIC ACID or '**Oleum**,' Sp. Gr. about 1·9. Contains some sulphuric anhydride dissolved in sulphuric acid. When made by distillation of Ferrous Sulphate, Ferric Oxide or **Colcothar** or **Polishing Rouge** remains behind. The formula $H_2S_2O_7$, *i.e.*, $H_2SO_4+SO_3$, contains about 45% SO_3. Commercially the range of SO_3 content is from 10% to 40%.

ACIDUM SULPHUROSUM.

H_2SO_3=82·08; SO_2=64·0636.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A colourless liquid, with strong sulphurous odour, and containin **B.P. '14**, 5% of SO_2. Sp. Gr. 1·025. P. Belg. IV. 6%.

Preparation.—By roasting sulphur or by heating copper and sul phuric acid, or carbon and sulphuric acid, and dissolving the gas in wate Sulphur Dioxide is also available compressed in cylinders.

Sulphurous fumes arising from coal combustion, as in the much discusse Battersea Electric Power Station, can be oxidised to Sulphuric form, instea of being discharged into the air. Carbon Dioxide, Carbon Monoxide, an flue dust are other grave factors affecting human vitality.

Uses.—This solution of Sulphurous acid is applied externall as a lotion—one part to two or more of water and sometimes a littl glycerin added—for affections such as chloasma, ringworm pruritus, thrush, and chapped hands, with very good results. It i sprayed into the throat for tonsillitis, diphtheria (better diluted) an asthma, or used as an inhalation, a teaspoonful to a pint of cold water It is strongly antiseptic, and has been used in whooping cough b fumigating the room. Also diluted, for fœtor of the teeth, *e.g.* in syphilis.

Internally it has been used in cholera (freely diluted). As a rectal injection, a 1 or 2% solution of the gas. Also for gastric fermentation accompanied by sarcinæ, and in typhoid (20 to 30 minim doses, diluted) every 2 or 3 hours.

Magnesii Sulphis, $MgSO_3+6H_2O$=212·4736.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

White crystalline powder. Soluble 1 in 90 in water. Given in diphtheria and other infectious diseases. Large doses may be given with impunity. **Tablets** 5 grains.

Magnesii Hyposulphis. *Syn.* MAGNESIUM THIOSULPHATE. $Mg.S_2O_3, 6H_2O$=244·5336.

Dose.—8 grains (**0·5 Gm.**) in water.

Colorless crystals, very soluble in water. Spasmodic coryza and asthma, resistant cases successfully treated by Magnesium Hypo sulphite tablets 0·5 Gm., 4 to 6 daily, or the intramuscular injection every fourth day for two weeks of 10 Cc. of a 10% solution. Injections stated to be painless and amelioration of symptoms to follow almost immediately.—G. Boissel, Presse Méd., May 17, 1930.

Asthma of 2 to 25 years' standing treated *per os.* Results satisfactory, no contraindications.—M. J. Fenton, B.M.J. ii./30,940.

Intramuscularly begin with 5 Cc. and increase to 10 Cc. of 10% solution.—M. J. Fenton, B.M.J. ii./30,986.

Magnesium Hyposulphite Sterules contain 10 Cc. of 10% solution.

Sodii Hyposulphis.—*Syn.* SODIUM THIOSULPHATE (*B.P.* '14). **U.S.,** P. Ital. V. and F.E. VIII. (without dose). $Na_2S_2O_3+5H_2O$= 248·192.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**).

Crystals soluble in water 1 in 1. Insoluble in alcohol.

Uses.—As a lotion, 1 in 10 for chloasma, ringworm, etc. It may be made to evolve sulphurous acid as, *e.g.*, in the following : Sodium Hyposulphite 6, Diluted Sulphuric Acid 1, Water 32.

Useful in clearing out the intestinal tract (in arteriosclerosis).

PURGATIVE ACTION.—In Italy medical men and the general public demand sodium hyposulphite (specially re-crystallised). For internal use the dose is from 1 to 6 grammes; its antiputrescent action is said to be superior to that of the sulphite. While passing through the blood stream it is transformed first into sulphite and then into sulphate.—Ph. Notes.

BLOOD PRESSURE REDUCED by Sodium Thiosulphate *per os*, but made patient feel poorly.—H. H. Sanguinetti, L. ii./30,1291.

ECZEMA.—0·45 to 0·75 Gm. intravenously repeated daily without danger for weeks at a time.—L. i./31,649.

PELLAGRA.—Even advanced cases cured by intravenous injections of 10 Cc. 10% solution 20 to 60 injections necessary. No complications.—I. Sabry, L. ii./31,1022; Jl. Trop. Med., Sept. 15,'31,303.

BURNS, AND DERMATITIS CAUSED BY ARSENIC AND MERCURY.—Moist applications of a 1 or 2% solution of Sodium Hyposulphite beneficial in treatment.—per Jl. A.M.A. ii./25,636.

Intravenous Use in Mercurial and Bismuth Stomatitis and Arsenical Poisoning.—In dose of 3 to 4 injections of 0·45 to 0·6 Gm. in 5 Cc. of water intravenously alternate days it is potent—possibly for all acute metal poisoning.—H. C. Semon, B.M.J. i./24,664; stated to be non-toxic up to 2 Gm. doses.

Large doses (2 Gm. or over) will *not* cure Arsenical dermatitis, but will make it worse. The best dosage is that advocated by Dennie and McBride (Jl.A.M.A., Dec. 27, '24), *i.e.*, 0·3, 0·45, 0·6, 0·75, 0·9 Gm., etc., with intervals of a day or two.—H. Schussler, Jl. Intrav. Therap., Jan. '26,11.

See also our pp. 174, 197.

Mercurial stomatitis and a case of tissue reaction due to leaking of Neoarsphenamin from a vein treated by 0·45 Gm. Hyposulphite in 10 Cc., 0·6 Gm. given prior to Arsphenamin was followed by slight rigor.—China Med. Jl., Sept. '25, per C.D. ii./25,899.

Antidotal action in Mercuric Chloride or Mercurochrome poisoning ***not substantiated.***—K. I. Melville & M. Bruger, Jl. Pharm. & Exp. Ther. Sept., '29,7; Mendelson, Med. Jl. & Rec., 1927, per Pres., Oct., '28,349.

For inorganic Arsenicals *per os* valueless.—Jl. A.M.A. i./27,1220.

Potassium Cyanide poisoning. Two injections of 10 Cc. 30% of value.—per Jl. A.M.A.i./27,1525. 1 Gm. intravenously.—Klin. Woch., July, '28,1351, per Pr., Oct., '28,268.

In the later treatment of Arsenic and Mercury poisoning not of much value. Liver Extract of value in Salvarsan dermatitis. Intramuscular injections of 5 to 10 Cc. of a 1=1 preparation.—L.i./29,1102.

Sterules of Sodium Hyposulphite are prepared, **0·2, 0·45** and **0·6 Gm.** in **5 Cc.**

***Ametox** (T.M. 451286) and ***Thiostab** (T.M. 458531) are preparations of Sodium Hyposulphite.

Lotio Sodii Thiosulphatis, Mid. H: Sodium Hyposulphite 20, Sulphurous Acid 45, Glycerin 30, Distilled Water to 568. In tinea versicolor.

DISTEMPER in dogs is well treated by Sodium Hyposulphite. First give a purgative of 4½ to 7½ grains of each Calomel and Scammony, then the hyposulphite, 9 to 15 grains in milk or sugar and water next day for 10 days.

Respirator Solution.—Sodium Carbonate Cryst. 60, Sodium Hyposulphite 52, Water 100. A proportion of Glycerin should be added to keep the wool or material moist. P. A. W. Self came to the conclusion that the above is the most satisfactory to neutralise both Chlorine and the Acids formed.—P.J.ii./15,133.

Sodii Hydrosulphis. $Na_2S_2O_4$=174·114.

White powder soluble in water with evolution of SO_2. An active reducing agent used in manufacturing processes.

ARSENICAL POISONING.—100 mgr. per kilo weight *per os* enabled animals to survive fatal doses of Arsenic. Low toxicity but may cause vomiting. Best given in a fresh solution followed by 25 Cc. Normal Hydrochloric Acid.—W. R. Bond and E. W. Gray, Jl. A.M.A. i./29,1919.

Sodii Hydrosulphidum. *Syn.* Sodium Sulph-hydrate. NaHS=56·177. When fresh this is in hygroscopic crystals, very soluble in water. Used in analytical work.

ACIDUM TANNICUM.

Syn. TANNIN. $C_{14}H_{10}O_9$=322·078. F. E. VIII., P. Belg. IV., P. Ital. V.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Extracted from galls with ether containing a little alcohol and water.

Estimation of Tannin and Identification of Drugs containing—see Edn. XIX, pp. 94, 95.

Soluble in water 1 in 1 slowly, and in glycerin, less so in alcohol 90%. Almost insoluble in ether and chloroform.

Incompatible with ferric salts, acids, alkalis, silver and other metals and with gelatin—*cf.* Tannalbin *infra*. Furthermore, Tannin solution precipitates the majority of alkaloids from solution, hence is occasionally employed as an antidote to these.

Uses.—Throat and mouth wash 1 to 2 %. Astringent and styptic in powder form for epistaxis (by coagulating the albumin). Sometimes given in dysentery. Rectal injection of 30 grains in a quart of hot water, with or without opium, has been given in cholera. Burns have been treated with a 2 to 3% solution in ether painted over the part 2 or 3 times daily. It is a useful astringent applied to the gums and as an ingredient in tooth powders.

Tannic Acid Treatment of Burns under First-Aid Conditions.

Dissolve 440 grains Tannic Acid in 2 pints (2½%) of water and add 8·75 grains Corrosive Sublimate. Soak lint in warm solution and wring out gently; apply smooth side to burn, cover with layer of wool and fix with gauze bandage. Wash hands thoroughly before touching lint. In face burns keep eyes closed and smear vaseline over eyelids, eyebrows, and round eyes and cover with wool. Apply face-mask leaving regions round eyes, nose and mouth exposed through slits.—W. C. Wilson, M.R.C. Report No. 141, B.M.J. ii./29,824.

Tannic Acid Packets containing 110 grains are available to produce ½ pint of the solution and may be kept ready for use.

The Corrosive Sublimate in the solution is poisonous, and limits use as First-Aid and Nursery medicament.—D. A. Coles, L. ii./29,1011. Description of First-Aid outfit.—*ibid.*, 1022. (We agree—***better omit it.*** —W.H.M.)

First advocated by E. C. Davidson (Surg. Gyn. & Obstet., 1925, XII, 202). Results confirmed by W. C. Wilson. 2½% solution sprayed on and dried, *e.g.*, by electric lamp bulbs, in bed case, or by hot air from an electric drier, at intervals of one hour till the parts are covered with a thin brown layer of coagulated tissue.—L.ii./29,955.

2% solution applied for 24–48 hours with good results.—R. M. Gordon, L. i./28,336. 2½% solution ***sprayed on*** hourly for 8 hours and allowed to dry without dressing. No part of burnt area should touch bedclothes or bed.—G. Herzfeld, *ibid.* 520.

50 cases treated. Promotes rapid analgesia, invariably lessens severity

nd often prevents acute toxæmia, sepsis usually avoided, scarring less marked, nd death rate reduced. Prognosis, even in children with 40% of body sur- ce affected, not necessarily grave. Extended use recommended.—W. C. Vilson, B.M.J. ii./28,91-94.

Burns in children. Reduction in mortality in Belgrave Hospital for Chil- ren attributed to use of Tannic Acid and nursing. Prevents absorption of xins. There is no changing of dressings, hence no trauma. Spray every hour until a crust forms.—C. P. G. Wakely, M.P.C., July 10, '29,32.

No better than other local remedies. Shock best treated by introduction fluids into the circulation.—C. Donald, L. ii./30,949.

Tannic Acid well spoken of. Picric Acid, Aluminium Acetate, and Acri- avine condemned.—Pack and Davis, B.M.J. i./31,628.

I fpus forms under scab, drain by cutting channels in the coagulum—do not se fomentations or moist dressings.—E. I. Lloyd, B.M.J. ii./31,178.

Not to be applied to the finger-tips—coagulum forms tight tourniquet and nger-tips may slough off. Burns of buttock close to rectum difficult to treat -infection may spread from rectum under the coagulum. Apply Tannic Acid or 3 inches from anus and treat skin round the anus with Flavine or Picric cid solutions. Also fails when burn is near the mouth. Ulcerating conditions nd excoriations of skin from fæcal fistulæ of small intestine well treated.— ir W. I. de C. Wheeler, M.A. '31,85.

Sheffield experience.—Burns and scalds treated with 2½% solution as spray. ormation of protective coagulum lessens primary shock by relieving pain, and revents toxæmia. Severe sepsis is avoided and scarring reduced. The area cleaned with Ether, under light Gas and Oxygen. It is sprayed hourly with ne warm solution until the coagulum forms. No dressings are required. The atient is beneath electric light bulbs (as above). The coagulum loosens in a eek or so and is then removed. The use of Picric Acid or oily fluid, in first-aid, nterferes with the action of the Tannin and should be avoided.—Wilfred ynes, November, 1931.

DIARRHŒA.—Tannic Acid in mild cases of, is unnecessary and in severe ases is useless.—B.M.J.E. i./26,48.

DISINFECTION OF THE HANDS.—A 5% watery solution of Tannin of value, ne Tannin acting as a fine coating (similar to a glove) which prevents bacteria ntering the skin.—B.M.J.E. ii./24,78.

lycerinum Acidi Tannici, atque cum Alumine, *v.* Glycerin.

argarisma Acidi Tannici contains 10% of Glycerin of Tannin.

otio Acidi Tannici Sulphurosa ST. BART.'s H.

Glycerin of Tannic Acid 1, Sulphurous Acid 1, Water to 8.

Ovules with Theobroma basis for vaginal discharges.—*v.* Ovules.

Pessus Acidi Tannici 10 grains each in theobroma oil basis, 120 rains weight.

uppositoria Acidi Tannici (*B.P.* '14).

3 grains with theobroma oil *q.s.* to 15 grains.

℞ **Suppositories of Tannic Acid with Opium,** 1 grain in ddition, or ℞ Morphine ½ gr.—The latter are W.H.

Aluminii Tannas.—TANNAL INSOLUBILE.

$Al_2(OH)_4(C_{14}H_9O_9)_2+10H_2O$ is made by precipitating a solution of Alu- inium Trisulphate with Sodium Tannate (not Tannin as stated in the paper) r better by treating freshly made Aluminium Hydroxide with Tannin Solu- on.—W. H. M. As astringent for chronic catarrh of the respiratory organs. —Y.B.P. 1913,122.

Albuminum Tannicum. P. Jap. U.S. X., P. Belg. IV., F.E. VIII. *Syn.* **Tannalbin.** (TRADE MARK 216134/1899, renewed 1926; PATENTS ecame void.)

Dose.—8 to 15 grains (**0·5 to 1 Gm.**), P. AUSTR., PH. NED. V. with method f making.

A compound of tannin with albumen, in pale brown insoluble, tasteless owder.

Manufacture.—See details of our work, Edn. XIX, p. 96.

Uses.—A disinfectant soluble in the intestines, but unaffected by the stomach, given for diarrhœa.

Zinci Tannas. *Syn.* "SEL DE BARNIT."
Is obtained by treating Zinc Oxide 10 in Water 15 with Tannin 50 in Alcohol 45% 100. Dry at gentle heat. We have found this method satisfactory.
Used as ophthalmic application and for decubitus and other skin lesions.
Further **Tannates.** Details of making.—Y.B.P. 1913,125.

Di-acetyl-tannin. *Syn.* **Acetannin, Acidum Acetyltannicum, Tannyl Acetate,** U.S. X. ✱**Tannigen.** (T.M. 322568; PATENT 1228/1894, void.)
$C_{14}H_8(COCH_3)_2O_9 = 406{\cdot}1392$.
Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachet.

Manufacture.—Tannic Acid 10 Gm., Acetic Anhydride 15 Cc.; heat on water bath 1 hour. Add 25 Cc. Alcohol and pour the solution into 500 Cc. of water, collect, wash and dry at not exceeding 60° C.—C. E. Corfield and G. R. A. Short, P.J. ii./24,115.
A tasteless, insoluble powder, but rendered soluble by alkali. In diarrhœa. Dissolves in the intestine appearing in the urine as gallic acid. Should not be prescribed with alkali. P.G. VI. defines as mainly a mixture of Diacetyl and Triacetyl-Tannin.

Methyl Ditannin. *Syn.* ✱TANNOFORM (T.M. 216873). $C_{29}H_{20}O_{18} = 656{\cdot}156$.
A compound of tannin with formaldehyde in reddish-white powder insoluble in water, soluble in alcohol and alkalis. Used as an antiseptic in ointment (1 in 10) or dusting powder alone or with 1 to 4 parts of starch, for bedsores, hyperhidrosis, pruritus, eczema (particularly in interdigital eczema), and piles. In diarrhœa. (*Dose*—from 1 to 20 grains according to age) and enteritis and for tender feet. Is official in P.G. VI.

ACIDUM TARTARICUM.

$(CH.OH.COOH)_2 = 150{\cdot}0468$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufactured from acid potassium tartrate by heating with water and sufficient calcium carbonate to almost neutralise, converting thus into insoluble calcium tartrate and soluble neutral potassium tartrate. The latter is also converted by aid of calcium chloride into calcium tartrate. The two portions of calcium tartrate are washed and then decomposed with the necessary quantity of sulphuric acid.

Soluble 10 in 8 water, 1 in $2\frac{1}{2}$ alcohol 90%, 1 in $4\frac{1}{2}$ glycerin, 1 in 120 ether 0·720, 1 in 5 absolute alcohol. Nearly insoluble in benzol and chloroform.

Incompatible with alkaline carbonates, and with potassium calcium, and mercury salts.

Uses. For making Effervescent Preparations, Effervescing Tablets (see Neutralisation Table for equivalents), and cooling drinks.

Specificity in Antiseptics.—This acid (as also Malic Acid) has been found to be active against *B. aerogenes capsulatus. Vide Vol. II.*
For details as to presence of Lead in Tartaric Acid and Method of Estimation, also for Acidum Glutaricum, Syn. Pyrotartaric Acid, see Vol. II.

Collutorium Acidi Tartarici. *Syn.* **Tartaric Acid Mouth Wash, R.D.H.**
Tartaric Acid 1 grain, Potassium Acid Tartrate 2 grains, Lemon Syrup 3 minims, Saccharin Soluble ¼ grain, Water to 1 ounce. Use ½ ounce in ½ tumbler of water.

ℙ1 ACONITI RADIX.

ℙ1 *Aconite, Aconitine, and their preparations.*

Root collected from *Aconitum Napellus* (*Ranunculaceæ*) and dried. *B.P.* '14 gives no dose but requires not less than 0·4% ether-soluble alkaloids. FR. CX. gives *Dose* (max. single), **0·1 Gm.**; max. during

hours **0·3 Gm** That of P. Belg. IV. in powder dried at 60° C., ntains 0·5% alkaloids.
P.G. V. and Fr. Cx.—Selected heavy roots from the wild plant llected before the end of the flowering season. (Not in P.G. VI.)
U.S. X. assays biologically with *average dose* 1 grain (**0·06 Gm.**).
F.E. VIII. assays biologically with dose 0·01 Gm. and 0·05 Gm. in 24 hours.

Use.—Anodyne, diaphoretic, diuretic.
Externally the liniment, as such, or mixed with chloroform or bella- nna liniment in neuralgia and rheumatism (causes tingling and mbness).
Internally the tincture diminishes the force and rate of the pulse, pecially in the early stages of fevers and mild local inflammations, ch as feverish cold, laryngitis, and first stages of pneumonia and ysipelas. It also relieves the pain of neuralgia, pleurisy and eurism. Large doses cause tingling of mouth and skin generally. Acute tonsillitis. Children generally well treated by Aconite. For child 5 to 10 years old, 1 to 2 minims of Tincture.—Yeo.
Experiments on small animals show that Aconite is of no avail reducing the frequency of the pulse, but clinically good results e obtained in some manner from its use.—Sir Dyce Duckworth.

℗**Aconiti Folia** may contain as much as 0·6% total alkaloid.
Fr. Cx. and Supp. Nouv. 1926 employ fresh leaves for making Alcoolature Aconit, 1=1 using 95% alcohol for macerating 8 days. To contain 0·1% kaloids. Max. single dose 1 Gm., max. daily dose 5 Gm.

Antidotes.—Apomorphine $\frac{1}{10}$ grain hypodermically or an netic of mustard or Ipecacuanha Wine; stimulants; Amyl itrite. Atropine Sulphate $\frac{1}{50}$ grain hypodermically has been commended, also Digitalis Tincture 20 minims hypodermically course of 4 hours was successful.
Aconite poisoning from taking Liniment in error. As Ipecacuanha Wine—cardiac depressant—had been given as first antidotal treatment, it was ought well to give only one mustard emetic to save the enfeebled heart. ead was kept low—feet raised, a sinapism was placed on the heart and hot nnels to the extremities and abdomen. Strychnine and digitalis hypo- rmically and brandy per rectum. Artificial respiration kept up unceasingly, covery after six hours. Quantity of Aconite was sufficient to kill six persons. -L. i./11,162.
Poisoning by a tablespoonful of Liniment containing 40 minims each Lin. coniti, Lin. Belladonnæ, Lin. Chloroformi and Tinct. Capsici with 80 minims aultheria Oil. There was no dilatation of the pupils as would have been pected, nor odour of Wintergreen, but vomiting occurred smelling strongly it. Recovery under Liquor Strychninæ, 10 minims hypodermically and ounces of hot strong coffee into the rectum. A remarkable recovery taking he aconite into account, which amounted to 35 times the maximum dose of he official tincture.—L. ii./10,1270.
For Aconite and Belladonna combined, see also 'Poisons and Antidotes.'

℗**Chloroformum Aconiti, B.P.C.** 1=1. Prepared as Chloro- rmum Belladonnæ.—B.P.C. 1907.

℗**Extractum Aconiti Radicis Alcoholicum.** Fr. Cx. and P. Belg. IV. (Extrait d'Aconit) prepared from the root with 70% alcohol and tandardised to 1% alkaloids. *Max. single dose,* $\frac{1}{2}$ grain. Max. uring 24 hours 1½ grains approx. F.E. VIII. is assayed biologically. . Ital. V., 0·5% alkaloids.

℞ **Fluidextractum Aconiti, U.S. IX.** (Not now in U.S.)

Average dose.—**0·03 Cc.** ($\frac{1}{2}$ minim). Standardised to 0·5 Gm ether-soluble alkaloids of Aconite in 100 Cc.

℞ **Linimentum Aconiti** (*B.P.* '14).

Prepared by macerating and percolating the root with Alcohol 90% Useful in neuralgia. *It is not suitable for painting on the gums.*

Should contain 0·2% *w/v* ether-soluble alkaloid.

9 minims of Aconitine liniment=about $\frac{1}{30}$ grain aconitine hav proved fatal.

℞ **Linimentum Aconiti Compositum.** G.H. *Syn.* **A.B.C. Liniment**

Aconite Liniment, Belladonna Liniment, Chloroform Linimen equal parts. To be well shaken before use, as the olive oil in th chloroform liniment is not soluble in the other ingredients. B.P.C uses Liniment of Aconite 2, of Belladonna 2, Chloroform 1. Mis cible. ℞ **Linimentum Aconiti cum Chloroformo,** B.P.C. Chloro form 1, Aconite Liniment 7.

The Oil in the original 'A.B.C.' formula seems to be essential—otherwis proves too irritant to sensitive skins.

Poisoning by ½ ounce of A.B.C. liniment. Liquor Strychninæ and salin enema 2 pints, containing 2 ounces brandy, saved life. Afterwards ¼ grai morphine. The lethal effect of the aconite was abolished by stimulatin action of the atropine.

See also Poisons and Antidotes.

℞ **Pilula Aconiti.**=2 minims of tincture, *i.e.* $\frac{1}{5}$ grain approx. o Root in each. *Dose.*—1 hourly.

℞ **Tinctura Aconiti** (*B.P.* '14).

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). As a febrifuge 2 minim every 10 minutes or quarter of an hour for an hour, then repea dose every hour till skin acts well and temperature is reduced.

Strength 1 in 10 approx. by percolating dried root in No. 40 powde with 70% alcohol and standardising to 0·04% ether-soluble alkaloid

Fr. Cx. has the *B.P.* '14 strength made with 70% alcohol. It is termed *Teinture d'Aconit au dixième* and has max. single *dos* 9 minims approx.

P.G. V. (1 in 10). Maximum single dose, 0·5 Gm. Max. dail dose, 1·5 Gm. U.S. X. has 1 in 10, assayed biologically. Averag dose 10 minims. P. Ital. IV., P. Belg. and Ph. Ned. V. contai 0·05% alkaloids.

By the U.S. X. Assay, the tincture, administered subcutaneously to guinea pigs, has a minimum lethal dose not exceeding 0·0004 Cc. per Gm. body weight

F.E. VIII. is assayed biologically.

℞ **Tablets** are prepared each equivalent to 2½ minims. To b directed to be dissolved in a little water.

℞ **Pastilli Aconiti,** and ℞ **Trochisci** contain each 1 and ½ minim of Tincture respectively. Given in fevers and mild in flammatory conditions.

℞ **Fleming's** and **Turnbull's Tinctures** of **Aconite** are abou six times the (*B.P.* '14) strength made with 70% Alcohol. They are used externally, and were given internally in doses of 1 to 5 minims Combined with equal volume of Weak Tincture of Iodine (*B.P.* '14 it is sometimes ordered to be painted on the gums for pain.

ℙ1ACONITINA.

Syn. ACETYLBENZOYLACONINE. $C_{34}H_{45}NO_{11}$=643·359.

ℙ1Crystallised Aconitine.

Dose.—$\frac{1}{600}$ grain to $\frac{1}{200}$ grain (**0·0001 to 0·0003 Gm.**), and may increased if desired with extreme caution, the maximum single se being 0·00 1 Gm.

FR. CX. gives 0·0005 Gm. as maximum during 24 hours; E. VIII., 0·001 Gm.

B.P. '14 gives no dose, U.S. X. *average dose* $\frac{1}{400}$ grain.

An alkaloid obtained from *Aconitum napellus* root and dried leaves content about 0·03%. In colourless crystals. ***Soluble*** in dilute ids, alcohol and chloroform (1 in less than 1), less readily soluble ether, and almost insoluble in water and petroleum ether; melts at 8° C. In weak acetic solution yields a red crystalline precipitate th potassium permanganate.

U.S. assays biologically and tests for pseudaconitine and atropine Vitali's test—*q.v.* By the U.S. test subcutaneously in guinea-pigs should have a minimum lethal dose of 0·000000055 Gm. and not ore than 0·000000065 Gm. per Gm. body weight.

A drop of dilute solution placed on the tongue produces a charac-ristic tingling sensation.

Antidotes, vide Aconite.

Uses.—Employed externally (*vide* Unguentum Aconitinæ and eatum Aconitinæ) in neuralgia, *avoiding mucous membranes, and w skin.* Internally in the form of a pill is a depressant, calmative, d diaphoretic.

1Aconitinæ Nitras. $C_{34}H_{45}NO_{11}HNO_3$=706·3748. A crystalline stable salt, soluble in water and alcohol. *cf.* Vol. II.

Dose.—$\frac{1}{600}$ grain (**0·0001 Gm.**), hypodermically.

1Hypodermic Tablets ($\frac{1}{640}$ grain), to be dissolved in warm water.

1Granules of Aconitine FR. CX. and of **Aconitine Nitrate** FR. CX. contain $\frac{1}{10}$ mgr. in each, and are coloured pink.

1Aconitinæ Hydrobromidum. $C_{34}H_{45}NO_{11}.HBr.2\frac{1}{2}H_2O$=769·3218, and **ℙ1Aconitinæ Hydrochloridum** are crystalline Salts with dose as for the Nitrate.

1Oleatum Aconitinæ.

Aconitine 2, Oleic Acid by weight 98. Dissolve; may be perfumed is painted on the skin (avoid broken) for neuralgia.

1Unguentum Aconitinæ (*B.P.* '14).

Aconitine 1, Oleic Acid (by weight) 8, (1 grain=2 drops); heat ntly to dissolve, and add Lard 41. Mix thoroughly. Best freshly epared. A piece of the size of a bean is gently rubbed in for facial uralgia, avoiding broken skin and mucous membranes.

ADEPS LANÆ.

Wool Fat (*B.P.* '14). **U.S.X., Ph. Ned. V., P. Ital. V., F.E. VIII.** NHYDROUS LANOLIN.

The purified yellowish cholesterin fat of sheep's wool, M.Pt. out 40° C. Sheep's wool yields from 10 to 30%.

TRADE MARKS: 'Lanoline' 50214 (Class 48) and 50215 (Class 3) 1886. PATENT 4992/1882 *expired.* The specification states tha 'the invention relates to a new or improved manufacture of fatt matter from Wool Fat termed "Lanolin."' The process describe is of centrifugalising waste liquors of wool, washing and purifyin by a suitable solvent.—*cf.* C.D., March 20/15.

Soluble 1 in 25 ether, 1 in 18 oil of turpentine (both with som residual matter), almost insoluble in alcohol 90%.

Adeps Lanæ can only be saponified by alcoholic solutions of Potas under pressure—paraffin can be easily detected by this means.

Adeps Lanæ Hydrosus. **Hydrous Wool Fat** (*B.P.* '14). Commonl known as 'Lanolin.' Wool Fat 7, Distilled Water 3. Melt an mix. FR. CX., P. BELG. IV. and PH. NED. V. have 25% wate P. ITAL. V. has Wool Fat 30, Liquid Paraffin 6, Water 10.

Yellowish white ointment basis. More water, up to about equa weights of fat and water, may be incorporated with it without affect ing its consistence. Soluble partly in alcohol, while ether an chloroform dissolve only the fats it contains.

Wool Fat is readily absorbed by the skin (especially if washed wit ether). It helps absorption of narcotic extracts, quinine, iodine potassium iodide and chaulmoogra oil.

When an ointment containing Mercuric Chloride or Carbolic Aci is ordered, it is usually intended for antiseptic purposes, therefor the *anhydrous* should be used, otherwise caustic action may result

Sapolanoline. Lanolin 5, Soft Soap 4. For acne and eczema.

Unguentum Lanolini.

Lanolin (hydrated) 2, Soft Paraffin or Vaseline 1. Mix. May b perfumed to form **Lanolin Cream.** Less sticky than Lanolin.

Lanolin, lard and soft paraffin, *p.æq.* melted, give a useful basis, a also Wool Fat 9, with Almond Oil 1. **Unguentum Lanæ Composi tum** (*B.P.* '14) is Wool Fat 2, Prepared Lard 2, Paraffin Ointment 1

Crembas. A proprietary basis for making Vanishing Creams, Cold Cream and Toilet Creams generally. In the presence of a trace of alkali it will com bine with from 1 to 5 times its weight of water, forming a white cream which i free from a greasy or sticky feeling. It may be mixed with Lanolin and wate

For other Ointment bases see Unguenta and for M.pts. of Fats, Table, *Vol. II*

Cholesterol. *Syn.* CHOLESTERIN. $C_{27}H_{45}OH+H_2O=404{\cdot}3784$ is prepared from wool fat by saponifying the same with potash, and extracting the cholesterol with ether. It is also a constituent o gallstones, often to the extent of 90% or more, and can be obtaine from these by extraction with spirit.

TUBERCULOSIS and malignant disease have been treated by giving cholesterin *v.* Edn. XIX., p. 101.

PERNICIOUS ANÆMIA.—Cholesterin in form of cream and butter *ad lib* has been given with success. (Cholesterin is antagonistic to hæmolysis.)

50 injections of 0·2 Gm. in 5 Cc. Olive Oil, in 10 weeks, gave rapid improve ment in grave anæmia and tuberculosis.—per Jl. A.M.A. i./26,1103.

BLACKWATER FEVER has been treated by Cholesterin internally.

In epileptics the average blood Cholesterol is subnormal and is more variabl at the time of fits than in periods of freedom from attacks, a fall usuall preceding an attack.—M. Gosden, J. T. Fox and W. R. Brain, L. ii./29,14.

holesterol Metabolism.

During pregnancy there is a disturbance of Cholesterol metabolism resulting large changes in the ratio of free to ester Cholesterol in the plasma, but to s definite changes in the total Cholesterol. There is a great increase in e percentage of plasma Cholesterol (free and ester) in subacute parenchy-tous nephritis, associated with an increase in the Cholesterol ester content the kidney. Some eliminate from diet in cholelithiasis all substances h in sterols, *e.g.*, eggs, milk, butter, and suggest that diet should be restricted this way during pregnancy.—J. Addyman Gardner and H. Gainsborough, i./29,603,619.

The significance of Cholesterol in physiology and pathology.—E. N. amberlain, B.M.J. ii./29,896.

MENTAL DISORDERS.—Cholesterol is an important controlling factor in dation processes, its power being best exercised in relation to Lecithin when h substances are present in normal amounts in the blood. Brains of general alytics are remarkably deficient in Cholesterol and a case of dementia ecox was completely cured by parenteral injections of 0·25 Gm. Cholesterol Olive Oil every 3rd day for a month and then ½ Gm. daily in emulsion by mouth for two months, with a special Cholesterol-promoting diet.—B. H. aw & J. S. Sharpe, B.M.J. ii./31,252.

The photo-active function of Cholesterol in skin cancer.—Prof. A. H. Roffo, ii./31,1187.

ERGOSTEROL *q.v.* extracted from ergot resembles Cholesterol.

ÆTHER.

$C_2H_5.O.C_2H_5 = 74·078$.

℗ *Applicable to Northern Ireland and* Ⓟ *Irish Free State.*

Syn. ÆTHER SULPHURICUS; ETHYL OXIDE.

Dose.—45 to 60 minims (**3 to 4 Cc.**), or 15 to 30 minims **to 2 Cc.**) repeated.

Manufactured by the distillation of Alcohol and Sulphuric Acid—yl Hydrogen Sulphate being first formed which reacts with a further ntity of Alcohol, liberating Æther and Sulphuric Acid again; in this nner the Acid will react with a very considerable quantity of Alcohol. Gr. 0·720.

Soluble 1 in 10 of water, and the ether similarly dissolves about same amount of water. Is miscible in all proportions with ohol. Ether is a solvent for a number of alkaloids, fats, resins, l of mercury perchloride and biniodide, also of bromine and iodine.

Commercial Varieties in General Use.

her Purificatus (*B.P.*'14). For inhalation as anæsthetic. '**Æther.**' PH. NED. V., P. HELV., P. JAP., P. BELG. IV., P. ITAL. V., and F.E. VIII. Sp. Gr. 0·720. *Syn.* **Æther Purissimus, Ether officinalis, Æther pro Narcosi.**

n our own and several Continental Pharmacopœias this is directed to be efully tested and preserved.

The *B.P.* '14 allows Æther and Æther Purificatus to be manufactured m either Ethyl Alcohol or Industrial Methylated Spirit.

Ether Purificatus. Pure Ethyl Ether for production of **æsthesia** may now be made from Duty-Free Rectified Ethyl ohol (*cf.* L. i./29,295). It attains a standard much higher than t required by the B.P. '14 for Æther Purificatus. It contains trace of Peroxide, Aldehyde, or decomposition products, ich may cause unpleasant post-operative effects. Its admini-ation ensures comfortable anæsthesia.

Æther Purificatus should be stored in amber bottles wrapped in black paper.

The 'toxicity' which develops in Ether, develops proportionately to the degree of oxidation by exposure to light and air; oxidised Ether, in addition to producing local and necrosing effects, has distinct action on heart and central nervous system. Toxic phenomena due to presence of peroxides. The Anæsthetic Committee of the Roy. Soc. Med. reported (Oct., 1926), 'the purer the Ether, the better the anæsthetic.' Suggested that analyst's certificate of purity should accompany all anæsthetic Ether.—H. E. Laws, L. i./27,789; B.M.J. i./27,932. *Further data vide Vol. II.*

Effects of Acetaldehyde, Peroxide, Mercaptan and Sulphide.—Jl. Pharm. and Exp. Therap. '26,409.

The rate of formation of peroxide increases greatly as the amount present increases.—F H. Carr, B.M.J. ii./27,664. *See also* L. ii./27,1305.

Ether Convulsions—A complication of Ether anæsthesia: some fatal and non-fatal cases reported. Due to presence of impurities, Acetaldehyde and 'peroxide,' in the Ether. Impurities present on delivery and increased in amount by existing methods of Ether administration. Question of Ether purity requires further investigation. Exposure to light and air should be eliminated, and stale Ether should be discarded. Use of amber glass in Ether vapour bottles to protect Ether from theatre lights, and metal tube projecting below level of Ether replaced by bone or ivory. Convulsions treated by prompt ventilation of patient with Oxygen containing 5% Carbon Dioxide.—S. R. Wilson, L. i./27,1119. *See also* L. ii./27,765.

Ether convulsions during anæsthesia are rare, but dramatic and dangerous.—W. Stanley Sykes, B.M.J. i./30,1128.

Acetaldehyde and Peroxide in Ether ***highly improbable*** to cause convulsions. ½% said to be toxic (Wilson). Carbon Dioxide *per se* apparently not responsible.—J. Ross Mackenzie, B.M.J. i./31,441.

Sterules, Anæsthetic, contain 1 and 2 ounces (30 and 60 Cc.) of this Ether for the operating bag and (being sealed) for hot climates.

Ether, 'Methylated.' Sp. Gr. 0·720.

Made from Industrial Methylated Spirit. Contains a little methylic ether, and may be used for spraying to produce local anæsthesia, as it begins to boil below 27° C. (80° F.), and is free from water. It is *not* adapted for producing general anæsthesia.

Ether, 'Methylated.' Sp. Gr. 0·730 and 0·735.

Adapted for pharmaceutical and technical extraction purposes. For photography a purer preparation, Sp. Gr. 0·725, is available.

CO_2 as stabilising agent for Ether and storing in Copper containers.—C. Langton Hewer, L. i./29,770.

✱**Ethanesal** (T.M. 410750). Described as Ether free from mercaptans and aldehydes. It contains certain ketones, some CO_2 and some Ethylene, pure Ether being the vehicle. The CO_2 appears to act as a stabiliser. Stated to be less irritating than ordinary Ether and to stimulate the respiratory system less.—R. L. Mackenzie Wallis and C. Langton Hewer, B.M.J. i./21,565; L. i./21,1173; Pr. Mar./22,168. *See also* Sir C. English.—L. ii./23,302, and other refs., Edn. XVIII., p. 113.

The preparation was found to consist of 95·5% Ether with about 4% of normal Butyl Alcohol and a small quantity of an aldehyde. Anæsthetic properties to be attributed to Ether.—H. H. Dale and co-workers.—L. i./23,424. *See also* B.C.A. '26, A863.

Uses.—Internally Ether is a rapid stimulant in syncope. Is carminative. May relieve dyspepsia and asthma. Hypodermically it may save many cases of syncope, collapse, and shock from hæmorrhage and injury. It depresses nerve tissue, in very large doses it tends to depress muscle tissue, including cardiac muscle but it never excites.

Recoveries from shock by intracardiac injection of Ether. 1 Cc. direct into the left ventricle successful in two cases. Response dramatic and gratifying.—N. Hay Bolton, B.M.J. ii./26,482.

WHOOPING COUGH treated by ether injected intramuscularly in the buttock. Supposed to act by combating the spasmodic element of the disease. 1 Cc. up to age of 7 or 8 months, and in older children 2 Cc. repeated daily or on alternate days—not invariably successful.—L. i./21,1311. Most dramatically successful; also useful in broncho-pneumonia.—B.M.J.E. ii./22,49.

Rectal injection with equal amount of Olive Oil, 1 drachm of the mixture for every year of age, gave good results when combined with drugs, *e.g.*, Belladonna.—C. Elgood, B.M.J. i./25,963.

For general anæsthesia ether produces less depression on the heart than chloroform, but its use is unpleasant both to the patient and to the operators. Its suffocating action on the patient, if suffering from any lung or bronchial affection, is very irritating, and has proved fatal. Care must be taken not to employ it near a light; its vapour is $2\frac{1}{2}$ times heavier than air and very inflammable, and as an anæsthetic it has to be used freely.

Dangers from Ether are usually respiratory and due to excess of saliva; Atropine hypod. before the ether prevents this. Inversion, pulling the tongue and slapping the back usually expels mucus.—R.D.H.

Crile's Nasal Tube method of giving Ether. Less Ether is required than by employing the ordinary way using the open drop method. An injection of Morphine $\frac{1}{4}$ grain with Atropine $\frac{1}{75}$ grain is given an hour before the operation. Oxygen in addition not found necessary.—L. ii./09,364.

With flannel or with lint in the open method (Skinner's mask), so adjusted that all inspirations and expirations pass through the fabric, a more or less equable atmosphere containing approximately 8 or 9% of ether vapour may be depended upon.—L. i./12,217.

Anæsthesia in throat and nose operations. Ether is thought to be the proper anæsthetic—safer than chloroform.—Felix Rood, L. i./20,433.

Rectal use of Ether as an anæsthetic is favoured by some, *e.g.*, where presence of the Ether cone over the face would hinder the operation; or in diseased condition of the lungs. Contraindicated in diseased state of the intestines and generally in abdominal cases. It is thought that a little under six volumes per cent. in the circulation is required to produce complete anæsthesia.

Deaths during ether anæsthesia. See Edn. XVII., p. 107.

Ether an ideal anæsthetic for squint operations on children. Chloroform so dangerous, its use forbidden.—T. Harrison Butler, B.M.J. ii./25,1150.

Sterules of Ether contain half a drachm in each for hypodermic injection as a dose in heart failure. 20 to 60 minims have proved a successful restorative in typhoid fever and for dyspnœa, but *cf. antea*. These are made with 0·735 ether.

SCIATICA has been treated by injection of ether with either cocaine or morphine subcutaneously into the sciatic nerve. 5 minim doses of ether with 2 minims of 1 in 12 cocaine, or morphine injection 3 minims, using a $2\frac{1}{2}$-inch needle.

Oxygen and Alcohol administered during anæsthesia by Ether or other Anæsthetics. Apparatus is described by means of which Oxygen is bubbled through Absolute Alcohol, and thence the combined vapour mixes with the anæsthetic in a mask.—L. i./11,331. *cf.* **Oxygen and Alcohol Administration.** The apparatus consists of a cylinder of Oxygen, wash-bottle containing Alcohol with exit tube above leading to a Schimmelbusch mask or Hewitt's modification, which is specially adapted for giving Oxygen with anæsthetics. These are joined together in series in this order.

Prolonged Anæsthesia under Ether alternately with Gas and Oxygen.

Temperature sometimes remains subnormal for many hours. Nitrous Oxide in connection with Oxygen may be more generally used, but it causes inconvenient rigidity, also faintness, dilated heart, persistent vomiting, etc., but by using Ether alternately with 'Gas' and Oxygen these objections in great measure disappear. Rigidity can be entirely avoided. The method consists in anæsthetising the patient with Ether, and when a certain degree of Ether saturation is reached changing to Nitrous Oxide and Oxygen—the latter being again dropped in favour of Ether on certain indications, and so on. The details are—when Ether anæsthesia is thoroughly established Nitrous Oxide and Oxygen in proportion of 96 or 95 to 4 or 5 is given. The corneal reflex, if still present, but dulled before the change, will now be abolished after a few breaths of gas, but the pupil will remain small and colour good. After two minutes or so the Oxygen must be increased to 12, 15 or 20%. Frequent breaths of fresh air are admitted, and generally at the end of five minutes it is advisable to return to Ether. This second Ether will probably extend over five minutes, after which Gas can be given for 10 minutes.

As the operation proceeds the Ether applications become shorter and the intervals between them longer. The anæsthesia is even, and shock during and after operation seems to be very slight. The method is applicable to a large variety of patients and cases. There is a wide margin between light and deep narcosis. Post-operative conditions good. Nausea less than after open Ether. Rebreathing was allowed on a few occasions without apparent detriment.

In the discussion it was thought that the amount of Nitrous Oxide necessary must be very great, and hence the method seemed as if it would be cumbersome. The question of post-operative vomiting was fully gone into.—A. L. Fleming, R.S.M., Sec., Anæsthetics, Dec., 1910, p. 1, *et seq.*

Gas and Oxygen (1 of Oxygen to 4 of Gas) in nose and throat work preceded by at most Atropine 1/200 gr. in children, or Morphine $\frac{1}{6}$ gr. c. Atropine 1/150 gr. in adolescents, or Combined Hyoscine, Morphine and Atropine for adults. Only a small amount of anæsthetic or a mixture of Chloroform and Ether (Ethanesal) is needed. —H. E. G. Boyle, B.M.J. ii./21,591.

Gas, Oxygen, Carbon Dioxide, Ether Anæsthesia, with local or regional analgesia and de-etherisation, the nearest approach to the ideal anæsthetic, but requires expensive and complicated apparatus and considerable experience. —J. Ross Mackenzie, L. i./27,164.

The effects of Ether, Chloroform, Ethylene and Nitrous Oxide anæsthetics on the gastro-intestinal tract.—G. H. Miller, Jl. Ph. & Exp. Ther., Feb. '26,41.

Oil of Orange, *Effect of, on Anæsthesia.*

'Essence of Orange,' 1 ounce (*v. infra*) and 3 ounces of Ether placed in the hot water bottle of Gwathmey's three bottle vapour anæsthesia apparatus, and Ether in the other two bottles, cause not only the odour of the anæsthetic to be completely disguised, so that the patient is unable to tell when its administration begins, but anæsthesia is improved. The result may be due to the pleasant sedative effect. Gwathmey states that **Essence of Orange** employed by him is composed of Oil of Bitter Orange Peel 1, Absolute Alcohol 3. —B.M.J. i./17,126.

Atropine and 'open Ether' administration.

An Atropine injection is given 1 hour before the ether to prevent the secretion of mucus in the air passages which may otherwise be caused by ether.—H. Bellamy Gardner, B.M.J. i./12,422.

Enucleation of tonsils by dissection is best done under open ether preceded by 1/100 grain atropine. Suitable for all patients from six months upwards. —H. Tilley, B.M.J. i./19,781; ii./19,27. (A death under C_2E_3 and C_3E_1.—H. S. Gabbett, *ibid.* i./19,739.)

Morphine and Atropine in the usual hypodermic dose do not affect kidney functions unfavourably, and given prior to Ether anæsthesia they prevent inhibition of kidney function and should therefore be of value in urologic surgery.—W. H. Haines and L. F. Milliken, Jl. A.M.A. ii./25,1855.

Anæsthesia. A modification of the open ether method.—F. W. Silk, B.M.J. i./19,635.

Crile's method of shockless surgery.—It consists of (1) a preliminary injection of Scopolamine to allay the patient's fear of the impending ordeal; (2) general anæsthesia with Ether, followed by (3) local anæsthesia with Novocain 1 in 200 combined with Adrenalin at the site of incision, and Quinine-urea-hydrochloride 0·75% solution into the peritoneum in cases of gastro-enterostomy. The object being to keep the brain free from shock before, during and after the operation.—W. I. De C. Wheeler, M.P.C. i./14,332.

Ether Infusion Anæsthesia by means of Saline Solution.

Burghardt, the originator of the method of Infusion Anæsthesia, used an ordinary infusion apparatus containing a 5% solution of ether in normal saline. The method was modified later. An hour before the induction Scopolamine $\frac{1}{100}$ grain, Morphine $\frac{1}{6}$ grain, and Atropine $\frac{1}{100}$ grain (as average) is given hypodermically, the selected arm is bandaged to a splint, vein exposed (a few drops of eucaine may be used)—cannula tied in and the solution run in rapidly. Induction usually lasts about ten minutes. The apparatus used consists of a reservoir containing a 5% solution of ether in normal saline fixed about 8 feet above the floor level, the solution by means of a pipette drips into an indicator (capacity 8 ounces) fixed below this and from thence into a warming chamber to which the cannula is attached.

The advantages claimed are :—

Surgical anæsthesia may be attained with 8 ounces of the solution, while for maintenance of the anæsthesia one pint an hour (1 ounce of ether) is in most cases enough. Great flexibility, patient can be adjusted with great nicety. Patient comes round within a few minutes. Post-anæsthetic vomiting and pulmonary irritation are both rare.—F. Rood, B.M.J. ii./11,974.

Solubility of Ether in Normal Saline.—At 15° C. 11·87 Cc. of 720 Anæsthetic Ether dissolve in 100 Cc. of Normal Saline (of strength 0·91% NaCl by weight).—R. R. Bennett, P.J. ii./12,146.

Ether Saline infusion compares favourably with other methods—5, 6 or 7% can be safely used. A 10% solution may produce hæmoglobinuria. It is best to begin with 5%. The method is suitable even for the old and feeble. Recovery is rapid and post-anæsthetic vomiting rare.—F. Rood, B.M.J. ii./12,608; L. ii./12,1801. D. W. Buxton's "Anæsthetics," 6th Edn.

Strength 7½% and amount raised from 200 to 600 Cc. given in 3 to 7 minutes. In one case over 2 litres of the Solution were given.—G. A. H. Barton, B.M.J. ii./12,610.

An apparatus described for giving.—E. G. Schlesinger, L. ii./12,1220.

Satisfactory results in 170 cases from intravenous use.—Pres., Jan. '23,5.

Scopolamine-Morphine Atropine with Ether Saline.—

Scopolamine (1/100 grain) with Morphine (1/6 to 1/4 grain) and Atropine (1/100 grain), given about ¾ hour before operation—under 5% Ether Saline. The combination is very useful, as the amount of Ether is reduced to a minimum. It is especially suitable for head, throat, etc., operations, as the anæsthetist is not in the way. The patient is spared the disagreeable sensations of inhalation method. No irritation of the respiratory organs; no after effects.—F. L. Napier, Glas. Med. Jl., July, 1912.

For a further method of Intravenous Anæsthesia see Paraldehyde.

Intramuscular Etherisation.—

Ether injection into the buttocks, 0·45, 0·8 and 0·8 Cc. respectively administered to three patients. In the first Ethyl Chloride was necessary, and in the second and third Chloroform to hasten anæthesia. Another operator found that he failed to induce anæsthesia, though 60 to 70 Cc. in 10 Cc. doses were injected. The patient was drunk in consequence 24 hours, and became very excited.—L. ii./12,1802.

Successive injections of 2 to 5 Cc. into gluteal region—into each side alternatively. Amount used roughly 1 Cc. per kilo body weight. Advantage in head and neck operations.—B.M.J. ii./13,394.

Intramuscular slow injection of Ether as anæsthetic; 5 Cc. every few minutes.—20 to 30 Cc. usually sufficient. Used in oto-rhino-laryngology.—B.M.J.E. ii./21,79.

Intratracheal Insufflation of Ether.—

Almost incredible operations have been done with this method on dogs, *e.g.*, complete removal of one or more lobes of the lung, complete division and suture of the thoracic œsophagus and complete division and suture of the transverse arch of the aorta. Employed in 25 cases with success.—B.M.J. ii./12,112; ii./13,393,1621.

The method will maintain anæsthesia after it has been established by the usual manner. A tube ⅔ of the diameter of the trachea is introduced into it nearly to its bifurcation. A fairly rigid silk woven catheter 30 Cm. long is used—the average size for an adult being No. 21 or 22 French. The warm anæsthetic—Ether, or a mixture of Oxygen and Ether—is introduced by means of a pump or mechanical blower—Elsburg's Apparatus is probably best. By this means respiration with full aeration persists, but with lessened respiratory movements.—D. W. Buxton's "Anæsthetics," 6th Edn.

The method of choice for all operations on head, nose, mouth, and throat, where satisfactory anæsthesia cannot be maintained with a free airway by the ordinary methods without inconvenience to the surgeon. When there is blood in the upper air passages it is a necessity.—S. Rowbotham, L. ii./26,584.

Tracheal insufflation of Gas and Oxygen.—W. Howard Jones, L. i./29,330.

Pharyngeal Insufflation Anæsthesia is a method of prolonging Ether anæsthesia after it is established by ordinary methods. The vapour is given through the nose by means of Crile's tubes, the mouth and nasopharyngeal space having been previously carefully cleansed.—D. W. Buxton's "Anæsthetics," 6th Edn.

Rectal Oil-Ether Anæsthesia. *Syn.* COLONIC ABSORPTION.—A mixture of Olive Oil and Ether in definite proportion and amount slowly introduced *per rectum*. An evolution of Intravenous Anæsthesia.

For children under 6 a 50% solution is used, allowing 1 ounce for every 20 lbs. of body weight. This is non-irritating and no preliminary medication is wanted. Between 6 and 12 years use 55 to 65% solution without preliminary medication. Keep the patient quiet and allow 20—30 minutes for the full effect. Use 1 oz. for every 20 lbs. body weight as before. Between 12 and 15 years use the same percentage and amounts, with possibly the addition of 1/12 grain Morphine and 1/200 grain Atropine hypodermically as a preliminary. From 15 years upwards a 75% mixture is used with same amount as before—1 oz. to every 20 lbs. It will be seen, therefore, that for an *adult*

weighing about 160 lbs., 8 ozs. of the mixture would be wanted (*i.e.*, Ether 6 ozs. and Olive Oil 2 ozs.). The 8 ozs. should be passed in slowly, *i.e.*, it should take 5 minutes. A maximum strength of 65% is now advised by Gwathmey.—D. W. Buxton's "Anæsthetics." See also R. B. Coleman, B.M.J.. i./26,943.

The method is claimed to be perfectly safe. The anæsthesia is automataiclly safeguarded by the gradual and equal absorption of the Ether from the colon, and at the same time its rapid evaporation from the lungs. A further reason for the safety is the affinity of the Oil and Ether for each other.—J. J. Gwathmey, L. ii./13,1756.

Ether (4 ounces) and oil (2 ounces) as anæsthetic per rectum in diverse operations with success.—H. M. Page and G. B. Mower White, L. ii./17,643.

Rectal Ether and Olive Oil. Has many advantages over inhalation, *e.g.*, ease of administration, absence of apprehension in patient, and of coughing, retching, and straining, reduction of shock, and absence of post-operative vomiting.—R. D. Laurie, B.M.J. ii./25,1123.

Chloretone 0·3 to 1·5 Gm. is given per rectum and after ½ hour Morphine and Atropine hypodermically. Twenty minutes later, Oil-Ether in proportion of 3 of Ether to 1 of oil (but this may be varied) is run into the colon slowly by catheter and funnel, one minute being allowed for each 30 Cc. The amount used is approximately 3 Cc. per kilo body weight. Should never exceed 250 Cc. For head and neck operations.—A. E. Boyd, Dublin J. Med. Sci., May '20, p. 121, per Pres., Feb. '21,37.

Safest and most effective method for relief of pains of childbirth, over a period of hours, so far devised. Greater applicability than Scopolamine amnesia, and does not require trained anæsthetist. Quinine an essential ingredient. Uterine inertia the only contraindication. The woman must be in active labour.—J. R. Harrar, Am. Jl. Med. Sci., per Jl. A.M.A. ii./25,1160.

Mixtures of equal volumes of Ether and Oil are the most suitable. Wash bowel immediately after operation and remove residual mixture. Smear Vaseline on buttocks and thighs to avoid irritation from escaping Ether. Chief among the disadvantages is that depth of anæsthesia is not under such control as with inhalation: this may mean death to the patient. It causes irritation of the intestines, leading sometimes to severe and even fatal hæmorrhage. Must not be used in room with open flame. Evidence is not convincing that the use of 2 to 6 Cc. ***Gwathmey's*** 50% ***Magnesium Sulphate*** *v. postea* materially lessened the amount of Ether required, but the action of Morphine on the respiratory centre is synergistic with the Ether and Magnesium Sulphate and numerous deaths have resulted from their combined use. Synergistic analgesia in childbirth is by no means safe in the hands of the unskilled. No method is suitable for universal use. The Gwathmey method mitigates the pains of labour, but no woman should be promised a painless labour. Should be used only in selected cases and by skilled anæsthetists.—R. A. Hatcher, Am. Med. Assn., Jl. A.M.A. ii./27,2114–2117; 2189–2193; 2258–2263.

In a series of 5,000 anæsthesias slight diarrhœa occurred in only 6 cases, and no deaths. (The retention enema now appears to consist of a ***2 to 1 Ether Oil mixture,*** with the addition of 2 drachms Paraldehyde.) A full description of technique is given. Has wider limits of safety than any inhalation method. Any pathologic condition of the bowel a contraindication.—J. T. Gwathmey, Jl. A.M.A. ii./29,447-452.

Safe and easily controlled, to use in all bad surgical risks. Leaves minimum of bad effects after operations lasting many hours.—W. Wood, B.M.J. ii./29, 1156.

The following formula is good. Magnesium Sulphate 2 oz., Glucose 1½ oz., Olive Oil 1 oz., Acacia 5½ dr., Ether 4 oz., Paraldehyde 4 dr., Morphine Sulphate ¼ gr., Water to 12½ oz. Rub the Acacia with Olive Oil in a dry mortar, dissolve the Magnesium Sulphate and Glucose in Water 7 oz., and add 1 oz. of this solution to the Acacia and Olive Oil, gradually adding the remainder. Transfer to a bottle and add the Morphine Sulphate dissolved in water. Dissolve the Paraldehyde in the Ether and add gradually to the rest. Make up to 12½ oz. It is not safe to use after 36 hours. Cork securely and keep in cool place. Introduce solution high up into bowel, preferably in a dark room: introduction takes 20 minutes. Anæsthesia usually occurs in 10 to 20 minutes. Ideal for operations on head and neck. No toxic after-effects or vomiting;

absolutely safe and has no after-effects on bowel. Wash out bowel when patient returns to ward.—B. Hughes, B.M.J. i./29,897.

Synergistic Method of Painless Childbirth (Rectal Ether Analgesia)—Gwathmey and others.

This method depends on the supposed synergistic action of Magnesium Sulphate and Ether, much smaller doses of both being necessary then when either is used alone. In obstetrics, when the *os* will admit three fingers, 0·006 Gm. (1/10 grain) **Morphine** in 2 Cc. of a 50% solution of **Magnesium Sulphate** is injected intramuscularly. The injection is repeated in two or three hours if the pain is not relieved. At the same time, an **Enema** composed of Ether 70 parts, Alcohol 8, Quinine Hydrobromide 0·6, and Olive Oil to 120 parts, is administered. Sometimes a mixture of Ether 90 and Chloroform 10 is used instead of Ether alone. Forty-seven patients had painless labours; 13 were fairly free from pain; while 7 failures were due to giving the drug too early in labour. The failures emphasised the short duration of anæsthesia—4 to 5 hours. No bad effects were noted on either mother or child.—Adler, 'Anæsthesia in Obstetrics and Gynæcology,' Wien. Med. Woch., '26, May 8.

The following are modifications :—

Preliminary high soap-suds enema followed by rectal irrigation of tepid water until return is absolutely clear. Patient placed in quiet room, eyes covered and ears closed with cotton. When *os* will admit 2½ or 3 fingers, with contractions at 6 to 7 minutes interval, of duration of 10—12 seconds, inject 2 Cc. 50% solution Magnesium Sulphate, combined with ¼ grain Morphine Sulphate intramuscularly, injection being given during one of the uterine contractions. If no effect within 20 minutes, repeat Magnesium Sulphate injection without Morphine. After the slight drowsiness, patient receives retention **Enema** of 20 grains **Quinine Alkaloid, Alcohol** 45 minims, **Ether** 2½ ounces, and **Olive Oil** to 4 ounces. Lubricate rectum and anal region, and warm mixture, which should take 10—15 minutes to empty. Rectal tube must not be inserted during uterine contraction. Patient becomes drowsy, and must not be disturbed for 2 or 3 hours, but should be carefully watched, as precipitate delivery often occurs. If no analgesia follows enema, a third injection of Magnesium Sulphate may be given an hour after. Effect of procedure lasts about 4 hours, and if patient is not then ready for delivery the whole treatment may be repeated, leaving out the Morphine.—D. Deutschman, M.J. & R., Oct. 6, '26,421—425.

From a further account, with approximately identical formula as the last-mentioned for the enema, we take the following :

A second or even third instillation (enema) may be given at intervals of 3 hours or more, but only 10 grains Quinine Alkaloid is used in these instillations, which are accompanied each time by a further intramuscular injection of 2 Cc. 50% Magnesium Sulphate solution.

Great relief is given in 85% of cases and more or less relief in 10%. It is not claimed to give painless childbirth, but gives relief in the agonising part of the ordeal. No ill-results to mother or child. 5,800 cases treated with satisfactory results.—J. A. Harrar, Am. Jl. Obstet. & Gynec., April, '27,486—491.

A paper to prove that Gwathmey's contention that ***synergism takes place between Magnesium Sulphate and Morphine is erroneous,*** and that no satisfactory evidence has been brought forward to show that this synergism does occur in man. The results of dog experiments are produced in support of the argument.—H. Beckman, Jl. A.M.A. ii./25,332—336. Gwathmey replies and produces extensive clinical evidence to prove that this synergism *does* occur in man—*ibid.* ii./25,1482.

0·25 Gm. per kilo the minimal effective dose causing depressant action. Addition of Magnesium Sulphate to colonic anæsthesia mixtures and its use in obstetric analgesia in the ***dosage now advised would therefore seem of no value.***—I. Neuwirth and G. B. Wallace, Jl. Ph. & Exp. Ther., Feb., '29,170.

On the one hand ***Gwathmey says Quinine is an essential stimulant to the uterus*** in his system of analgesia. The Quinine is given into the colon. But Bourne says it has no effect– on results of 2 cases. ***Balance in favour of Gwathmey's experience***—20,000 cases.—A. H. Skinner, B.M.J. ii./30,621.

Analgesia and anæsthesia in childbirth.—Discussion of Chloral Hydrate *per os* and per rectum, Opium, Twilight Sleep, and Adalin. **Morphine, 1/6 to ¼ grain, in 50% Magnesium Sulphate Solution** injected into the buttock has prolonged effect. The plain Magnesium Sulphate can be repeated without the Morphine, and the sedative effect is prolonged. With such an ideal sedative, why try others ? The effect of the Morphine on the fœtus is said to be fatal in some cases (Browne). Similar remarks apply to Twilight Sleep. As to anæsthetics, Chloroform, Ether, Nitrous Oxide, Ethylene, local and spinal, are reviewed.—A. Louise McIlroy, B.M.J. ii./30,549.

Morphine Sulphate Sterules ¼ and 1/6 grain, in 1 Cc. 50% **Magnesium Sulphate Solution,** also of the **plain Magnesium Sulphate Solution I Cc.** are prepared.

Benefit derived from Gwathmey's method in 97% of cases. Rectal Ether 30% more efficient than ' Twilight Sleep ' and without danger to the infant.—O'Donel Browne, L. i./31,643. Discussion.—*ibid.*

Ether Vapour per rectum has been employed and found to answer admirably for operations about the mouth, nose and post-buccal cavities. D. W. Buxton's apparatus consists of an Ether receiver holding 2 or 3 ounces and surrounded by a vessel containing water kept at 120° F. The vapour is conveyed to the rectum by a tube which has a glass intercepting drip chamber to prevent the passage of any liquid Ether which would be liable to cause dangerous results.—D. W. Buxton's "Anæsthetics," 6th Edition. See also B.M.J.E. i./15,46.

Oral Administration for Anæsthesia.—Ether 50% in Liquid Paraffin 1 to 2 ounces effectual in 90 seconds—probably the safest general anæsthetic and not followed by nausea. A little anæsthetic by inhalation may be wanted in addition. The dose may be sandwiched between mouthfuls of Port Wine. Useful for dressing wounds.—J. T. Gwathmey and H. T. Karsner.—B.M.J. i./18,254.

Application of Ether to Wounds employed in such inflammatory affections as peritonitis, periostitis, etc. Ether compresses considerably relieve the congestion.—M.P.C. ii./11,377.

Wounds have been swabbed out thoroughly with Ether (without watery solution beforehand).—B.M.J. i./15,398, also irrigated with 2% of Ether in lukewarm water with benefit.—A. Distaso and T. R. Bowen, B.M.J. i./17,259.

Infected wounds treated with Ether as antiseptic dressing. There was no sign of infection throughout the process nor rise of temperature.—B.M.J.E. ii./15,41.

Also by the Carrel-Dakin method of irrigation but it is costly and causes intense cold.—B.M.J. ii./17,598.

Bronchitis (post-operative). Intramuscular injection of 0·5 Cc. Ether. in 0·5 Cc. Olive Oil, with the addition of a local anæsthetic gave good results One such injection daily, recommended in every case of acute or chronic bronchitis without emphysema.—per Jl. A.M.A. ii./25,157.

Otitis Media, suppurative, treated by Ether which is run into the affected ear and allowed to evaporate. In the cases not relieved chronic mastoiditis was revealed by X-rays.—Med. Jl. & Rec., Apl., '26,503, per Pres., Feb., '27,64.

Ether is used as a menstruum and vehicle for skin medication, on account of solvent action on sebaceous secretion. Ethereal Tinctures and Solutions of Belladonna, Capsicum, and Menthol are prepared.

Preparations.

Perles of Ether, 3 minims in each. *Dose.*—1 to 4.

Spiritus Etheris (*B.P.* '14). Ether 1, Alcohol (90%) 2.

Dose.—60 to 90 minims (4 to 6 Cc.), or 20 to 40 minims (1·2 to 2·5 Cc.), repeated.

The older formula is occasionally prescribed, viz. :—

Spiritus Ætheris Compositus (B.P. '98).

Syn.—HOFFMANN'S ANODYNE, Liquor Hoffmanni, but the simple Spirit of Ether is now called Hoffmann's Anodyne abroad.

P. Belg. IV. has Ether 468, Alcohol (94%) 532. P. Ital. V. Ether 1, Alcohol (95%) 1. F.E. VIII. Ether 4, Alcohol (90%) 1.

Mistura Ætheris cum Ammonia (*Martindale*). *Dose.*—1 to 2 ounces.

Spirit of Ether 3, Aromatic Spirit of Ammonia 3, Water to 48. St. Th. H. terms this 'Patent'; with 1 grain of Camphor to the ounce 'Camphorated Patent.' A rapid stimulant. **Gt. Orm. H.** has Spirit of Ether 3½ minims, Aromatic Spirit of Ammonia 3½ minims, Tincture of Orange 2 minims, Chloroform Water to 1 drachm. Suitable for a child one year old.

℗**Lotio Ætheris Composita.** *Caution: Inflammable.*

Hoffmann's Anodyne 250, Ammonia Solution 4, Distilled Water 25, Pilocarpine Hydrochloride ½; Spirit of Lavender 25. For hair falling off, applied with friction, after washing with soap.

Spiritus Ætheris Nitrosi (*B.P.* '14).

Dose.—15 to 60 minims (1 to 4 Cc.).

An alcoholic solution containing ethyl nitrite (1·52 to 2·66% by weight), aldehyde and other substances.

For the Decomposition and Volatilisation of this preparation on storage, see Vol. II.

Uses.—Antipyretic, diaphoretic, diuretic, and stimulant. Relieves the spasm and pain of asthma, dysmenorrhœa, angina pectoris; also the pain of the passage of renal calculi and gall stones.

Spiritus Æthylis Nitritis. U.S. requires 3·5 to 4·5% ethyl nitrite.

Incompatible with Potassium Iodide (*cf.* Vol. II.), also with Phenazone unless previously neutralised with Sodium Bicarbonate; also incompatible with Salicylates and Ferrous Sulphate.

Ethyl Nitrite is the active ingredient; the other ingredients (Aldehyde, Ethyl Nitrate, Alcohol) play a subordinate part and of little practical importance. As there is a rapid loss of Ethyl Nitrite on mixing with water, it is best prescribed as such to be diluted just before use.—C. R. Marshall and E. Gilchrist, B.M.J. ii./15,125.

Any loss of strength in this is generally due to volatilisation of the Ethyl Nitrite alone. Only direct sunlight has any effect in inducing decomposition, and this can be prevented by storing in amber bottles with greased stoppers. —R. Wright, P.J. i./26,256.

It is stated that it does not affect the kidneys nor the sweat glands; it is neither diuretic nor diaphoretic.—P.J. ii./10,298.

Liquor Ethyl Nitritis. Solution of Ethyl Nitrite. (*B.P.* '14).

Dose.—15 to 60 minims (1 to 4 Cc.). Should be directed to be added to a small quantity of water at the time of taking.

A mixture of Absolute Alcohol 95 and Glycerin 5, containing in 100 parts by volume, 3 parts, or not less than 2½ parts by weight of Ethyl Nitrite (obtained by the interaction of alcohol, sodium

nitrite, and diluted sulphuric acid, at a low temperature). Store in small bottles. Sp. Gr. 0·823 to 0·826. It keeps better than the Spirit.

The circulation is distinctly affected by a fraction of a minim, yet large quantities do not cause death.—Leech.

Æther Aceticus. Acetic Ether. (*B.P.* '14)—Consists principally of ETHYL ACETATE. $CH_3.COO.C_2H_5$=88·0624. FR. CX.

Dose.—45 to 60 minims (**3 to 4 Cc.**) or 15 to 30 minims (**1 to 2 Cc.**) repeated. Sp. Gr. 0·900 to 0·907. Not less than 90% pure. Boils between 165° and 172° F. (73·9° and 77·8° C.). Was used in preparing Liquor Epispasticus, and is inhaled for laryngeal catarrh, ½ drachm to the pint of warm water.

Soluble in all strengths in Alcohol and Ether, and about 1 in 11 of water.

Dimethyl Ether. $CH_3.O.CH_3$=46·0478. A gas at n.t.p. Boils at 24° C. and at 100° C. exerts a pressure of 97 lbs. to the square inch. It can be safely compressed into cylinders. The gas condenses into a thin mobile liquid, with slightly ethereal, pleasant odour. Used as an anæsthetic.—L. ii./23,1302.

ÆTHYL CHLORIDUM.

Ethyl Chloridum (*B.P.* '14), P.G. VI., U.S. X. C_2H_5Cl=64·496.

Syn. CHLORYL ANÆSTHETIC, ÆTHANOLI CHLORIDUM, P. Belg. IV ✱KELENE (T.M. 414307).

Dose.—A good average for an adult by inhaler is 5 Cc.

Using a Rendle's mask—by the 'open' method which is thought preferable to one involving the breathing and rebreathing from a closed bag of vitiated air, 7 to 8 Cc. are advised as adult dose, 5 Cc. for children of 7 to 12 years. Cyanosis and subsequent discomfort is certainly less. The anæsthesia may be prolonged by removing the mask and spraying more on the sponge.

Manufactured by the action of hydrochloric acid on absolute ethyl alcohol. If made (*B.P.* '14) from Industrial Methylated Spirit will contain a small amount of Methyl Chloride. Tested (*B.P.* '14) to contain 99·5% Esters calculated as C_2H_5Cl.

At ordinary temperatures this is gaseous, but condenses into a colourless mobile liquid with a sweetish burning taste. Slightly soluble in water, readily in alcohol. Sp. Gr. 0·920 to 0·960 (U.S. about 0·921) at 0° C. (*B.P.* '14). On account of its low boiling point (about 50° F.) and the intense cold produced by evaporation, it is useful as a local anæsthetic in minor surgery, also for neuralgia. The part should be washed with soap and then with alcohol or ether before applying. In dental cases the patient is instructed to breathe through the nose during operation, the part is well dried, and other parts protected. Its vapour is inflammable.

For inducing general anæsthesia, it is described as pleasant; is taken readily by children and adults, with few or no after effects. Probably within the limits for which it is intended it is safer than any other anæsthetic excepting nitrous oxide. It has the advantage of requiring no complicated apparatus. A closed mask must not be used. It is quicker in action than ether.

To prolong the anæsthesia induced by ethyl chloride, chloroform has been advised as best. Ethyl Chloride (and Ethyl Bromide) are said to stimulate the heart, not to depress it as chloroform does.

Open Ethyl Chloride a very convenient method of induction—portable, easy to patient, rapid in action, and safer than Chloroform. Useful for enucleation of tonsils, circumcision, and other minor operations, as also for major operations.—J. Ross Mackenzie, L. i./27,165.

Bulbs for general anæsthesia (large spray) contain 3, 5, 7, and 50 Cc. **Tubes** for local use 10, 15, 30 and 50 Cc. with screw or auto-stopper. **Bottles** for local or general anæsthesia 60 and 100 Cc. These 60 Cc. bottles are the most convenient for use. **Metal Cylinders** contain 55 Gm., 110 Gm., 1000 Gm.

Instructions for treatment if dangerous symptoms arise in administration—

Ethyl Chloride or Somnoform.—See that the airway is clear and the clothing loose, and begin artificial respiration at once. Weak ammonia vapour may be held to the nostrils. Hot flannels should be placed over the heart, and chest smacked with a towel wetted in cold water. Artificial respiration must be kept up for at least an hour. The patient must be kept warm.

For R.D.H. method proceed as under Chloroform.

For tonsils and adenoids Ethyl Chloride is as safe as Ether. No death from it recorded.—C. B. Dale, B.M.J. ii./19,616; G. A. H. Barton and others, *ibid*, 690; L.B.C. Trotter entirely disagrees, *ibid*; 'not very safe.'—D. W. Buxton, *ibid.* 725.

Skin frozen *around* area of operation—little pain.—Pres., Jan., '23,6.

DENTAL EXTRACTIONS under Ethyl Chloride at Gt. Ormond St. Hospital for Sick Children found satisfactory. Closed method with a bag invented by Dr. Loosely is used. 60 to 180 seconds' surgical anæsthesia.—H. Sington, B.M.J. i./30,217.

RINGWORM well treated by Ethyl Chloride after washing with Sodium Bicarbonate and Spirit of Ether.—L. i./14,242. Patients to attend six mornings a week for at least two weeks. Useful and reliable.—M. W. Geffen, B.M.J. i./22,267.

WARTS have been treated with Ethyl Chloride—one application is sufficient if small, and for large warts at intervals of a week.

Ethyl Chloride with Eau de Cologne is available. The addition is thought to minimise post-narcosis effects.

✱**Dridustsol** (T.M. 384131) solutions in Ethyl Chloride of various *medicaments, e.g.*, **Amyl Salicylate, Ethyl Salicylate, Methyl Salicylate** *aa.* 2%, [B P]**Cocaine** 1%, **Menthol** 5%, **Benzoic Acid** 2%, **Salicylic Acid** 2%, **Cresol** 2%, **Formaldehyde** 1%, **Guaiacol** 2%, **Iodine** 3%, **Iodoform** 2%, **Naphthol** 2%, **Phenol** 2%, **Resorcin** 2%, **Picric Acid** 2%, **Mercuric Oleate** 1%, for spraying for antirheumatic, anæsthetic, and antineuralgic effect, for use in skin affections, and **Pyridine** 2% for inhalation. The spray is used at not less than 65° F. (18° C.) at a distance of 2 feet and deposits the medicament in a fine dry adherent powder or coating on the skin.

Somnoform is said to be a mixture of Ethyl Chloride 60%, Methyl Chloride 35%, and Ethyl Bromide 5%. 60 Gm. glass tubes with "valve stopper" for inhalation as an anæsthetic in dentistry. **Glass Capsules** contain 3 and 5 Cc.

If **dangerous symptoms** arise in administering proceed as directed under ethyl chloride. Respiration must be watched carefully.

ÆTHYL IODIDUM.

Ethyl Iodide—*Syn.* HYDRIODIC ETHER. $C_2H_5I = 155{\cdot}971$.

May be obtained by distilling a mixture of alcohol, iodine, and phosphorus. A colourless liquid (but liable to become coloured by setting free iodine). Of a penetrating odour; boils at 148° F., has Sp. Gr. 1·94; is not inflammable. ***Soluble*** 1 in 400 of water, and miscible with alcohol and ether in all proportions.

Uses.—It is useful *inhaled* as an anæsthetic to relieve the dyspnœa of bronchitis. As it contains four-fifths of its weight of iodine, it forms a rapid means of saturating the system with this element; iodine can be detected in the urine 10 minutes after inhalation, and as long as 30 hours after; it neither impairs appetite nor weakens digestion.

In bronchial catarrh it induces sleep and promotes expectoration when inhaled. It is useful for inhalation in œdema of the glottis from catarrhal laryngitis. It acts as an antispasmodic in angina pectoris, spasmodic asthma and certain forms of nervous dyspnœa.

Internally Ethyl Iodide is found useful in bronchitis, asthma, rheumatism, and for secondary syphilis.

Externally 10 to 20% ointment with paraffin basis may be used (stronger may blister).

General iodization may be produced by painting the iodide on the calf of the leg or between the shoulders, and covering with impermeable dressing. The system may be saturated with Iodine in this way.—Whitla. In angina pectoris, inhalation of Ethyl Iodide useful, action thought to be due to liberation of free iodine which is rapidly absorbed by the blood.—Yeo.

Measurement of Heart Efficiency.

Even when only minute amounts of Ethyl Iodide are contained in the air the amount of vapour can be determined by the use of Iodine Pentoxide to liberate Iodine. Ethyl Iodide is decomposed in the tissues, presumably into Sodium Iodide and Alcohol. The volume of circulation is determined by the subject inhaling a mixture of a few drops of Ethyl Iodide in 100 litres of air, the expired air passing through a mixing chamber. A sample of alveolar air is collected. This and equal volumes of the inspired and expired air are assayed. The circulation is found by the formula: Volume of air breathed per minute is multiplied by the difference in the amount of Ethyl Iodide in the inspired and expired air, and is divided by twice the amount found in the alveolar air.—Prof. Y. Henderson, L. ii./25,1317; see also *ibid.* 1343.

Mycotic Affections of the Skin treated by Ethyl Iodide inhalations. A large amount of Iodine enters the blood stream and only a small amount is returned in the venous blood, hence the tissues are exposed to large amounts. Inhale 1 Cc. in about 20 minutes. An apparatus is mentioned for controlling quantity. Fungus cured. Should be tried in asthma, hypertension, and tertiary syphilis.—B.M.J.E. i./30,62.

Ethyl Iodide Sterules.

Encased in cotton wool and rayon, containing 5 minims in each. The sterule is snapped, the fluid is absorbed by the covering, and inhaled for four or five minutes for spasmodic affections. This may be repeated three or four times a day. The patient requires no assistance, and can take one of the sterules from the bedside, in the dark if necessary.

In whooping-cough they have been found useful—the coughing fits are rapidly reduced.

Ⓟ**Ethyl Iodide and Chloroform Sterules** contain 5 minims of Ethyl Iodide and 10 minims of Chloroform, and are of the greatest service in the relief of asthma and whooping-cough.

Ⓟ**Ethyl Iodide, Chloroform and Menthol Sterules** as the last mentioned, with Menthol 1 grain in addition, are also made for use in bronchial affections.

Compound Ethyl Iodide Capsules L.H. contain these ingredients but $\frac{1}{8}$ grain only of Menthol.

Methyl Iodide. $CH_3I=141{\cdot}9554$.

A colourless liquid (when first made) boiling at 44° C. Sp. Gr. 2·285. As a vesicant is even more powerful than Cantharides.

Blisters may be produced in a few hours by rubbing in 15 to 20 drops.

ALCOHOL ÆTHYLICUM.

$C_2H_5OH=46{\cdot}0468$.

Together with notes on Allyl, Amyl and Methyl Alcohols.

Alcohol Absolutum (*B.P.* '14). U.S., Fr. Cx., P.G. VI.

Syn. Ethylic Alcohol, B.P. 1885.

Ethyl hydroxide, with not more than 1% by weight of water. Sp. Gr. 0·794 to 0·7969 representing 99·95% by volume and by weight to 99·4% by volume or 99% by weight.

Fr. Cx.—Sp. Gr. must not exceed 0·79683 at 15° C. Ph. Ned. V. allows 2% Water.

Dehydration with Glycerin, one part to three of Alcohol, with subsequent distillation, is a rapid method of dehydrating, better than Calcium Oxide, Alcohol 99·5% being easily recovered.

Alcohol (90% by vol.)—(*B.P.* '14). *Syn.* **Spiritus Rectificatus.** Spiritus Vini. **P. Austr.** '**Spiritus,**' **Ph. Ned. V.**

Contains 90% by volume, or 85·68% by weight, of Ethyl Hydroxide Sp. Gr. 0·8337. Strength 57·80° O.P. (*i.e.*, 100 volumes contain the same quantity approximately of Ethyl Hydroxide as 157·8 volumes of proof spirit). It is generally manufactured commercially of higher alcoholic strength, *i.e.*, about 70° O.P., Sp. Gr. 0·809, containing nearly 95% by weight of Ethyl Hydroxide, and is diluted as required.

'**Alcohol,**' **U.S. X.** has Sp. Gr. 0·816 at 15·56° C. (0·809 at 25° C.). and contains 94·9% by volume (92·3% by weight) of Ethyl Hydroxide. Alcool Ordinaire (officinal) Fr. Cx. has Sp. Gr. 0·81602 at 15° C., and contains approx. 95% by volume (92·43 by weight). P. Belg. IV. is 94·09% by vol., F.E. VIII. 95% by vol. as *P. Off.* **Spiritus Rectificatissimus,** P. Ital. V. is 94–96% by vol.

For various pharmaceutical purposes dilutions containing 70, 60, 45, and 20% by volume of Ethyl Hydroxide are convenient.

For Alcohol Dilution Tables see Vol. II.

Alcohol Dilutum, U.S. 41·5% Absolute Alcohol by weight (48·9% by volume).

Note.—**U.S. X.** orders on occasion a mixture of 'Alcohol' (94·9% by vol.) 3 parts and water 1 part as menstruum in making Tinctures and Fluid-extracts. This is approximately equivalent to 70% by volume.

Spiritus Tenuior, Proof Spirit. B.P. 1885, contained 57% Ethyl Hydroxide by volume=49% by weight. Sp. Gr. 0·920. Prepared by mixing 5 volumes rectified spirit, Sp. Gr. 0·838, with 3 volumes of distilled water, the contraction being about 2·5%.

The greatest contraction occurs when quantities are in the proportion of 3 molecules of water and 1 of alcohol.

The addition of 100 to the number of degrees "overproof" gives the number of proof gallons, thus 100 gallons of 56 o.p. spirit = 156 proof gallons.

Immature Spirits (Restriction) Act, 1915.

1. (*a*) No British or foreign Spirits shall be delivered for home consumption unless they have been warehoused for at least 3 years :

Provided that—(*b*) This restriction shall not apply (i.) to spirits delivered to a licensed rectifier, to a manufacturing chemist, or to a manufacturer of perfumes or to other persons licensed by Customs & Excise (ii.) to spirits delivered for scientific purposes.

2. Nothing in this section of the Act shall interfere with the supply of Rectified Spirits of Wine for the purpose of making medicines to registered medical practitioners, to hospitals and to persons and firms and bodies Corporate entitled to carry on the business of Chemist and Druggist.

Duty and Rebate to Chemists.

The following table shows the alterations in Excise duty on spirit since 1908.

In April, 1909 the duty was increased to				14/9	per Pf.	gallon (from 11/–).
In May, 1915	,,	,,	,,	16/3	,,	,, an increase of 1/6 over 14/9.
In April, 1918	,,	,,	,,	31/6	,,	,, an increase of 16/9 over 14/9.
In May, 1919	,,	,,	,,	51/6	,,	,, an increase of 36/9 over 14/9.
In April, 1920	,,	,,	,,	74/–	,,	,, an increase of 59/3 over 14/9.

At the time of going to press (1932) *with this edition there has been no further change.*

A **Rebate** of the various increases shown above as charged by the Excise authorities over the old 1909 duty of 14/9 is allowed to duly qualified Medical Practitioners, duly registered Pharmaceutical Chemists and Chemists and Druggists on all Duty-paid spirit used by them in preparations recognised as *medicines* by the Customs and Excise authorities. Rebate is also allowed on Rectified Spirits used for scientific research purposes approved by the Commissioners. The Rebate is not allowed on Tincture of Orange, Spirit of Peppermint, Mouth washes and the like. A complete record of spirit used must be kept, and claims for rebate must be made to the local Customs and Excise authorities within 3 months of use. A minimum period to claim for is one month. The present increase of 59/3 per proof gallon over the old 1909 duty of 14/9 is equivalent to £4 13s. 7d. per bulk gallon of S.V.R. 90%, 58 °/p.

A **Stock Book** has to be kept for obtaining rebate (a well-arranged one is issued by Messrs. Fletcher, Fletcher & Co., Holloway), showing the date, bulk quantity, strength and proof quality of each consignment of spirit received and the details of use.

A Spirit Rebate Book, containing Records of Spirits received and used and notes for making claims is issued by the Retail Pharmacists' Union, 4 and 5, Queen Square, London, W.C. 1.

F. C. J. Bird issued a set of Tables (C.D. Dec. 27, '19) for making the claims for repayment in question. Claims must be expressed in "proof" gallons to the second place of decimals. The following taken from the paper are useful:—

Proof Spirit Conversion Factors.

METRIC MEASURE.

Litres to Gallons—multiply by 0·2199.

To express:—

Litres	of	90%	Alcohol B.P. in	PROOF	GALLONS	...	Multiply by	0·3471
,,		70%	,,	,,	,,	...	,,	0·2697
,,		60%	,,	,,	,,	...	,,	0·2312
,,		45%	,,	,,	,,	...	,,	0·1733
,,		20%	,,	,,	,,	...	,,	0·0767

IMPERIAL MEASURE.

Gallons		90%	Alcohol B.P. in	PROOF	GALLONS	...	Multiply by	1·5779
,,		70%	,,	,,	,,	...	,,	1·2263
,,		60%	,,	,,	,,	...	,,	1·051
,,		45%	,,	,,	,,	...	,,	0·7877
,,		20%	,,	,,	,,	...	,,	0·3487
Pints		90%	,,	,,	,,	...	,,	0·1972
,,		70%	,,	,,	,,	...	,,	0·1533
,,		60%	,,	,,	,,	...	,,	0·1314
,,		45%	,,	,,	,,	...	,,	0·0984
,,		20%	,,	,,	,,	...	,,	0·0436
Ounces		90%	,,	,,	,,	...	,,	0·00986
,,		70%	,,	,,	,,	...	,,	0·00766
,,		60%	,,	,,	,,	...	,,	0·00656
,,		45%	,,	,,	,,	...	,,	0·00492
,,		20%	,,	,,	,,	...	,,	0·00218
Drachms		90%	,,	,,	,,	...	,,	0·001233
,,		70%	,,	,,	,,	...	,,	0·000958
,,		60%	,,	,,	,,	...	,,	0·00082
,,		45%	,,	,,	,,	...	,,	0·000615
,,		20%	,,	,,	,,	...	,,	0·000272

QUANTITY OF SPIRITS WHICH MAY BE SOLD BY A CHEMIST WITHOUT LICENCE.

In view of the Immature Spirits (Restrictions) Act, 1915, the Commissioners of Customs and Excise reduced the quantity of duty-paid Spirits of Wine (including Absolute Alcohol), which may be sold without a licence, to 5 *ounces fluid*. Strict inquiries should be made by the pharmacist as to requirements.—P.J. i./22,505.

EXPORT OF TINCTURES ON DRAWBACK. (IMPERIAL AND FOREIGN.)

Tinctures (includes medicinal spirits, flavouring essences, perfumed spirits, toilet vinegars and waters, dentifrices, hair washes and brilliantines) may be exported on drawback as merchandise, shipped or deposited in warehouse for use as ship's stores, and by Foreign and Imperial Parcels Post, direct from the premises of a person licensed to rectify or compound spirits (Licence, £15 15s. per annum).

Spirits of Wine (includes 'Absolute Alcohol,' Ethyl Hydrate and Ethyl Hydroxide) may also be exported as above.

QUANTITIES WHICH MAY BE REMOVED:—

(a) Not less than 2 bulk gallons of medicinal spirits and flavouring essences:
Not less than ½ bulk gallon of perfumed spirits (includes toilet water, hair washes, etc.):
Not less than 2 bulk gallons of Spirits of Wine.

(b) IF BY PARCEL POST.—Each parcel not less than 0·125 bu k gallon, but not less than a total of 2 gallons packed for export in one day.

Smaller quantities than the above may, on special application, be allowed by the local Surveyor, or by the Board, in special circumstances.

SHIPPING BILLS to be filled up by exporter and presented to the local Customs and Excise Officer, who will examine and check all goods for export and seal the parcels or cases containing same.

General References to Treatment, etc., with Alcohol

Physiologically t is narcotic and antipyretic, not stimulant.

1½ ounces of pure alcohol is all that can be utilised as a food in the human body per diem = 3 ounces of brandy and whisky = 7 ounces sherry = 15 ounces champagne, claret and white wines.

Even in smal quantities is injurious to the proper working of the brain (Victor Horsley).

In favour of Alcohol in moderation. The 'power of unlocking energy exerted by Alcohol' is one of the themes.—Charles Mercier, L. ii./12,1492.

90% of the crime of this country depends upon intemperance.—Lord Alverstone, L. i./13,197. See also *ibid.* 1351,1503; B.M.J. ii./12,1557; Sweden's Gothenburg System, ii./13,1107.

Fatigue and alcohol. Review of labour conditions in various trades. Effects of alcohol worse than useless.—A. F. S. Kent, L. ii./17,107.

Champagne injections in Surgical Shock. Transfer contents of a small bottle (about 400 Gm.) into an ordinary 500 Gm. serum bottle and add Normal Saline 100 Cc. Inject subcutaneously in the normal manner and repeat in six hours if necessary. If a prompt evacuation of the bowels is required give an injection of Pituitary Extract and if necessary repeat in three hours. Valuable in certain cases of pneumonia, influenza, etc.—L. i./13,1416.

Alcohol Injection in Neuralgia.

Intractable trigeminal neuralgia or tic douloureux has been treated by Alcohol injections (80% usually employed) around the supraorbital notch, 112 cases. Give Hyoscine 1/150 grain and Morphine ⅓ grain 20 minutes in advance. Prior to the Alcohol a few drops of 3½% Eucaine to assist in locating the nerve trunks.—Wilfred Harris, L. i./13,881; ii./22,122.

1,100 cases treated over 23 years. Injection of the nerve at the foramen ovale, or rotundum, relieves pain for at least a year, with injection of ganglion if neuralgia returns within 18 months.—Wilfred Harris, L. i./31,569.

Danger of injections for neuralgia. Novocain preferable to general anæsthetic.—L. ii./23,1407.

Pain will not return in the majority of cases if anæsthesia in the central distribution of the fifth nerve persists for a month. Definitely indicated for patients who have Radium treatment for cancer of the face, the absolute indication being carcinoma of the maxillæ or of the tongue. The treatment usually gives permanent relief, if enough Alcohol is injected.—B.M.J.E. i./25,22.

Trigeminal neuralgia. Hartel Injection route, using Alcohol into the region of the Gasserian ganglion.—L. Morris, L. i./31,122.

Dysphagia of laryngeal tuberculosis has been treated by injections into the sensory nerve of the larynx of 1 Cc. of 80% Alcohol containing 2 grains of β Eucaine Hydrochloride per ounce.

Inflammation of the Womb and ovaries and general inflammatory conditions of the female genital organs, have been treated by abdominal compresses, first of alcohol 60% strength, and afterwards with 90%, together with vaginal tampon 30% strength.

Pneumonia.—The routine use of alcohol, especially in early stage with idea of preventing cardiac failure, is a serious error.—Yeo.

For dietetic use the alcohol from grapes is purest; from corn is next best; from beetroot may be impure; and from potato the most dangerous.—W. W. W.

Typhoid (especially of children) has been treated by compresses of Alcohol, by means of a layer of absorbent cotton or folded gauze large enough to cover the abdomen entirely, these are covered with a compress of cold water with impermeable tissue above. The water is renewed hourly—the alcohol is left several hours.

In Skin Affections, especially syphilis, acne rosacea, psoriasis, erythema, and angio-neurotic œdema, alcohol has been applied to the part. Locally it is often useful.

Prolapse of Rectum treated by injecting 1·5 Cc. of absolute alcohol on each side or into the peri-rectal tissue at a depth of 2 to 2½ inches.—L. Findlay and J. B. Douglas Galbraith, L. i./23,76.

Alcohol as a Food. Moderate doses of alcohol help the digestive process by increasing the activity of the gastric movements and promoting absorption (*cf.* our Pepsin experiments, *Vol. II.*). It also increases the rapidity of

absorption of potassium iodide. Neither the intake of oxygen nor the output of carbonic acid gas is altered by alcohol, therefore as it has been oxidised in the body it saves tissue and is a food.—Hale White.

Wines may actually render digestion quicker and easier than it otherwise would be. This, indeed, is one of their most useful actions both in health and disease.—Hutchison.

So long as the amount of Alcohol in the body can be oxidised and destroyed by the tissues (about 0·185 Cc. per kilo body weight per hour) it acts as a food. When this amount is exceeded, it exerts a specific effect on the central nervous system, inducing toxic effects. An excess, however, of any food substance in the blood may induce toxic effects, *e.g.*, sugar, in time, may cause fatty degeneration of the tissues. The value of Alcohol as a food in disease is determined by its very rapid absorption under circumstances when ordinary foods are only absorbed with difficulty.—Dixon, p. 49.

Alcoholic neuritis, formerly common in this country, is now comparatively rare. Alcohol is rapidly absorbed from the stomach and small intestines in from ½ to 2 hours and undergoes no change in the process. It passes direct into the blood stream, and therefore the amount circulating in the blood varies according to quantity taken. Only a small proportion is excreted as such by the kidneys and lungs—about 2% and never more than 10%. The rest is eliminated as water and Carbon Dioxide. 10 Cc. of Alcohol is oxidised in an hour.—T. Grainger Stewart, B.M.J. ii./25,461.

Action of Alcohol on the human economy. Given therapeutically it must be well diluted. In diabetes it ought to be diluted down to 5 or 6% strength and in small doses.—E. Mellanby, B.M.J. ii./22,195.

Alcohol as a Drug of Addiction. Prohibition in other countries has led to other and worse addictions and industrial unrest.—W. E. Dixon, B.M.J. ii./21,822.

The murderers and cut-throats in Ireland, Russia and elsewhere are largely teetotallers. Present day unrest attributed to expensiveness of Alcohol. Would be sorry to see the moderate use of Alcohol abolished in this country. —Sir J. Barr, B.M.J. ii./22,199.

Table showing proportion of accidents in Germany and Austria, as also convictions for assaults, drunkenness, etc., greater on the Monday than other days. Prohibition in U.S.A. is increasing industrial efficiency.—E. L. Collis, B.M.J. ii./22,244.

A recrudescence of Alcoholism in France, due to the substitution of Aniseed liquors for Absinthe, which was prohibited in 1922.—B.M.J. i./26,157.

Venereal disease in relation to Alcohol. A predisposing factor.—L. W. Harrison, L. ii./22,942.

Prof. Starling holds, in moderation, it does not shorten life as compared with total abstinence.—L. ii./23,983.

Alcohol and life duration.—R. Pearl, B.M.J. i./24,948.

Alcohol for Burns.—Cleanse the burns with Alcohol (70%) under Chloroform anæsthesia. The whole surface of the burn and surrounding skin is rubbed vigorously with the dressing. Blisters are rubbed off with all dead tissue (better than using scissors and forceps). After cleansing, a dressing of sterile gauze wrung out of the Alcohol is applied, over this dry gauze and wool: repeat.—L. i./13,705.

Spirit-Glycerin.—For wounds, Spirit and Glycerin alone or with antiseptics, *e.g.*, Biniodide Spirit, Glycerin and Ichthyol, act like hypertonic saline in producing free discharge, and require frequent changing. Not so painful as Iodine.—A. Don, B.M.J. i./16,648.

General anæsthesia by Alcohol in Glucose solution. Two solutions are used: (*a*) Isotonic Glucose solution, (*b*) 30 Cc. of 96% Ethyl Alcohol in 70 Cc. of 25% Glucose solution. *Intravenous dose* is estimated according to patient's weight at 2 to 3 Cc. of the 96% pure Alcohol per kilo but the maximum allowance is seldom exceeded. A few Cc. of the (*a*) is allowed to run in first.—J. D. Constantin, L. i./29,1247,1263: L. i./30,1393.

Intravenous injection of Ethyl Alcohol 33·3% in Ringer's or Normal Saline. Animal experiments showed it to be without danger.—D. Thursz, L. i./30,831.

References to Inebriety.

Normal content of Alcohol in the human body.—See Vol. II.

" Drunkenness often chooses for its victims not the men and women originally the worst, but persons of strong social susceptibility and open in special respects to temptation."—Gladstone at Liverpool, 1893.—B.M.J. i./11,515.

Habitual inebriety is an evidence of an unsound mind rather than a cause of it.—C.D. ii./13,1259.

The majority of insane inebriates have become alcoholics because of congenital defects or tendency to insanity, not insane as a result of alcoholism. Alcohol, more of a coefficient than an actual cause of insanity—this is, however, disputed by others who say that Alcohol is the direct cause in a large proportion of cases.—B.M.J. i./11,1383.

Pharmacology of Alcohol—best looked upon as a drug.—R. B. Wild, L. ii./18,623.

Ammonium Chloride in doses of 30—60 grains with copious draughts of water is a suitable antidote to alcohol. The administration of smaller doses may be continued. It prevents the effects of alcohol, sobers the patient quickly and is a valuable preventive against delirium tremens. *See also* **Poisons and Antidotes.**

Test for Drunkenness.—The patient is made to inflate a bladder, *e.g.*, a football rubber. The exhaled air obtained is passed through potassium bichromate solution, which changes from yellow to green according to the amount of alcohol. Has been used in U.S.A. The test is not infallible.

Excretion of Alcohol in the urine as a guide to Alcoholic intoxication.—H. W. Southgate and G. Carter, B.M.J. i./26,463.

Alcohol and the motorist. Alcohol concentration in the urine as test.—G. Carter, B.M.J. ii./27,333.

Atropine-Strychnine, *see* **Atropine.** **"Normyl Treatment,"** *Vol. II.*

Cocktail habit.—L. i./29,1207.

Paralysis from drinking adulterated Ginger Wine in U.S.A. Apparently due to a Cresol-phosphoric Acid Ester.—B.M.J. ii./30,971.

Spiritus Vini Gallici.

Brandy. Contains 40 to 50% (or 60% in case of good Cognac) by volume of alcohol. Contains 0·6 to 1·2% Extractive, 0·3 to 0·8% sugar, 0·08% compound ethers and yields 0·01 to 0·02% ash.

Spiritus Vini Vitis, U.S. X. 48 to 54% by vol.

An ounce of brandy yields 100 calories of energy.—Hale White.—*cf.* Nutrimenta.

Spiritus Frumenti. Whisky prepared by distillation of fermented grain—barley, wheat, rye, Indian corn. Sp. Gr. is usually about 0·925, contains 37 to 47% by weight (44 to 45% by volume) of alcohol.

U.S. X. ' From wholly or partly malted cereal grains and not less than four years old, 47—53% by vol.'

Whisky Defined.

According to the findings of the **Royal Commission on Whisky (1909),** ***"Whisky is a spirit obtained from distillation from a mash of cereal grain saccharified by the Diastase of Malt."*** This decision allowed the name Whisky to be applied to the patent-still spirit in addition to the old pot-still spirit. The strongest objection to patent-still spirit was its ' tameness ' and lack of response to ageing, as a result of which many foreigners regard Whisky as plain Alcohol, and are astonished at the superior taste and aroma of matured Whisky.—" Veteran," Harper's Wine and Spirit Gazette, Oct. 31, 1931.

Malt Whisky is made entirely from barley, a fine hard grain being selected. In ***patent distillation, Indian corn or maize, rye and barley, are all employed.*** A Pure Malt Whisky is a mixture of heavy Highland Malts of 10 to 14 years' maturing and of lighter Malts of from 6 to 10 years' maturing. Spirits do not improve in bottle.

For Amounts of Alcohol in various Wines and Spirits, see Vol. II.

Eau de Paris. *Syn.* **Spiritus Coloniensis.**
Oil of Bergamot 20, Oil of Lemon 20, Tincture of Musk (1 in 50 Alc. 45%) 5, Oil of Neroli 2, Oil of Cinnamon 1, Oil of Cloves 1, Oil of Rose 1, Alcohol (90%) 1,800, Distilled Water 150 (all by weight). Macerate for 8 days, and filter.

Spiritus Myrciæ, Bay Rum, U.S., 1890.
Oil of *Myrcia acris* (*Myrtaceæ*) 16, Oil of Orange Peel 1, Oil of Pimento 1, Alcohol (94%) 1,220. Mix, and add gradually Water to 2,000. After 8 days filter. Of considerable renown as a **Hair Lotion.**
Another formula is:—Oil of Bay 5, Oil of Pimento 1, Oil of Orange 1, dissolved in Alcohol 400 then add West India Rum 200 and Water 400.

Aqua Mellis, Honey Water.
Yellow Sandal Wood, in shavings, 16, Alcohol (90%) 640.
Macerate 7 days, and pour off the alcohol. Add to the marc, Concentrated Rose and Orange Flower Waters, of each 160, shake well, decant, and add to the alcohol set aside. To this mixture add English Oil of Lavender, Oil of Cloves, of each 2, Oil of Bergamot 1, Oil of Nutmeg, Oil of Sandal, of each ½.

Alcohol Allylicum, $CH_2 : CH.CH_2.OH = 58{\cdot}0468$.
A colourless liquid miscible with water, with a pungent odour and burning taste. It inhibits bacterial growth. Investigation of Allyl Compounds. *cf.* Sinapis Chapter and Oleum Allii.
Open chain derivatives containing unsaturated carbon atoms are ***more toxic*** than isomeric saturated bodies. Thus Allyl Alcohol is fifty times more toxic than normal propyl Alcohol. In such bodies the combining energy of every atom in the double linking is not completely absorbed. The atoms possess a partial valency—hence the reactivity (Thiele).—O. C. M. Davis, B.M.J. ii./22,12.

Alcohol Amylicum. $C_5H_{11}.OH = 88{\cdot}0736$.
Consists principally of primary iso-amylic alcohol. $(CH_3)_2CH—CH_2—CH_2.OH$. Made by purifying and fractionating fusel oil, collecting that distilling between 257° and 289° F. (125° to 143° C.). Closer range of boiling points has been recommended. If B. pt. 128°—130° C., Sp. Gr. is commercially about 0·833 at 15° C.

Alcohol Methylicum, $CH_3.OH = 32{\cdot}0312$. **Pyroxylic Spirit.**
Dose.—30 to 60 minims (**2 to 4 Cc.**).

Synthetic Manufacture.
Methyl Alcohol is synthesised on a commercial scale from ***Water Gas*** (a mixture of Carbon Monoxide and Hydrogen) under pressure at about 400° C., in presence of a catalyst, usually Metallic Copper containing 10% Zinc Oxide,

$$CO + 2H_2 \rightleftharpoons CH_3OH.$$

The Badische Anilin and Sodafabrik produced 10—20 tons daily in 1923 at a cost of about 1/- per gallon—one quarter of the market value.—C.D. i./25,884.
Over a million gallons of Wood Spirit are used annually in this country for varnishes. By altering the physical conditions in the process above mentioned, it is possible to produce Ethyl Alcohol and Iso-propyl Alcohol. Synthesis of carbohydrates for food purposes is on the horizon. Iso-propyl Alcohol is hypnotic rather than 'stimulant.' It finds no favour in U.S.A.—B.M.J. ii./26,795.
Synthetic Methyl Alcohol made as above has been used as an anti-freeze mixture for radiators. Toxic effects in U.S.A.—B.M.J. ii./30,745.
If absolute and "acetone-free," Methyl Alcohol has Sp. Gr. 0·796, but it is not allowed by the Excise to be retailed pure unless duty-paid. Has been used internally for vomiting of pregnancy, sometimes combined with menthol. The commercial substance known as **Wood Naphtha, or Wood Spirit,** is 60 to 90% pure and contains acetone and other empyreumatic impurities. A purer preparation used in the arts has Sp. Gr. 0·81. It is a solvent of pyroxylin. The Methylated Spirit license is not necessary for the

ale of Wood Spirit, but that licence does not, of course, cover the ale of pure Methyl Alcohol.

Wood Alcohol Poisoning is generally accompanied by blindness. The end product excreted by the kidneys is Formic Acid. This reduces Fehling's solution, so its presence may interfere with diagnosis.—S. L. Ziegler, L. ii./21,618. It is said that blindness may follow even 7 or 8 Gm. of it, but the toxic dose is less. Numerous references to the subject in Edn. XVII., p. 121.

Fumes of Methyl Alcohol killed rats exposed to them in one or two days.—C. D., July 29/22,159.

In 1926 2,000 people died in U.S.A. as a result of drinking so-called whisky prepared from denatured Alcohol.—L. i./27,89.

Methylated Spirit Drinking.—Memorandum dealing with resolutions under consideration by the Convention of Royal Burghs, anent the prevalent evil of Methylated Spirit intoxication. Complicated regulations proposed by the Convention, under police control.—P.J. i./22,387. M.O.H. for Edinburgh stated large quantities were supplied.—C.D., April 2/21,448,449.

Toxic effects of Methylated Spirit.—Sir Wm. Willcox, L. ii./29,124.

Red Biddy.—No evidence of manufacture or sale in Scotland of admixtures of Red Wine and Methylated Spirits, though reason to believe such mixtures are made by purchasers of cheap red wine. Considerable quantity of latter made in Leith.—P.J. i./30,218.

Red Lizzie.—Known as **Lisbon Wine** in South and East London. Caused acute cirrhosis of the liver.—Sir Wm. Willcox, B.M.J. i./31,596.

'Red Liz' made with the current S.V.M. and Lisbon Wine.—P.J. ii./30,306.

For Red Biddy of Glasgow, see Vol. II.

For Detection of Methyl Alcohol in Ethyl Alcohol, etc., see Vol. II.

Spiritus Methylatus, Mineralised or Denaturalised.

Since May, 1924, this consists of a mixture of Spirit 90%, Wood Naphtha (Methyl Alcohol) 9·5% and crude ***Pyridine*** 0·5%, with in addition ⅜% (0·375%) of mineral Naphtha ('Petroleum') and a small proportion of Methyl Violet to colour. It forms an opaque mixture with water.

Caution.—It is not well adapted for local use—*e.g.*, for bed-sores. It caused DERMATITIS amongst surgeons of Manchester Royal Infirmary, and amongst barbers of that town. Pyridine was probably the cause of the trouble. (The Pyridine was added to render the spirit undrinkable.)

Industrial Methylated Spirit was introduced by the provision of the Revenue Act, 1906. This is simply a mixture of plain 'Spirits' with one-nineteenth of its bulk (5% of its volume) of Wood Naphtha (Methyl Alcohol) and is considerably purer and of greater utility for manufacturing purposes.

Bond for correct use by Manufacturer.

The Commissioners do not as a rule require a Bond where the quantity does not exceed 100 gallons per annum, but they reserve the right to require a Bond in any case where considered necessary.

The Act provided for the use of Industrial Alcohol in the composition of Soaps, Compound Camphor, Aconite and Belladonna Liniments of the *B.P.* '14.

The regulations governing the use of both Methylated and Industrial Spirit have recently been revised and consolidated by the following :—

Methylated Spirits Regulations, 1930.

In operation since January 1, 1931.

S. R. AND O. 1930. No. 832.

(*Abstract of Salient Points.*)

NOTICE No. 50 (BUFF COLOUR).—***Applicable to all Users.***

34. Methylated Spirits may not be purified.

39. Methylated Spirits may not be recovered or re-distilled, except by sanction. Must be kept under lock, or to satisfaction of Officer. Bottles to be labelled ***'For external use only,'*** or ***'Not to be taken,'*** or otherwise to the same effect.

NOTICE No. 53 (BUFF COLOUR).—Sale of **Industrial Methylated Spirits** for medical and scientific purposes by wholesale chemists and dispensing chemists under ***Regn. 50.***

(1.) Any wholesale or dispensing chemist with a Methylated Spirits Retailer's

Licence may, on application, receive Industrial Methylated Spirits in quantities *not exceeding* 4 *gallons* for sale to authorised users on receipt of requisition in the *official form*. This applies to *all* sales of Industrial M.S. to dispensing chemists, and the limit of 1 gallon is now *withdrawn*.

May be sold in quantities *not exceeding* ½ *gallon* at a time to a medical practitioner, dentist, veterinary surgeon, hospital, or nursing home, on a *signed order*—purchaser *need not hold official authority* or submit a requisition, but order must be signed by a doctor, chemist, or veterinary surgeon. This does *not* cover supplies to dispensing chemists.

(2.) Industrial M.S. may be ***exported*** in quantities *not exceeding* 4 *gallons*. Requisitions unnecessary, and the spirits may be supplied merely on customer's order.

(3.) Every wholesale or dispensing chemist wishing to sell Industrial M.S. must apply for special authority, *whatever authority he may already hold*.

(4.) *Regn.* 50 requires Industrial M.S. for sale in accordance with para. (1) and (2) to be kept apart from I.M.S. used for other purposes, a separate stock being kept under proper control, and an account kept of this separate stock. Accounts must be balanced monthly, orders and documents must be kept for two years and the contents of bottles or other containers must be labelled 'Industrial Methylated Spirits.'

NOTICE NO. 54 (GREEN COLOUR).—***Applicable to dispensing chemists.***

1. Where already authorised to receive Industrial M.S. for dispensing, he is automatically and without further application entitled to use and dispense I.M.S. as at (i) and (ii) para. 2, while being liable to conditions in para. 3 and 4. If existing authority covers use of I.M.S. in making articles not in Second Schedule he will continue to be entitled to use I.M.S., but as from Jan. 1, 1931 no authority held prior to that date to sell I.M.S. to other chemists is valid and special authority must be obtained.

2. All future applications must be made on special form (Ex. No. 225A), and grant of authority will convey (i) right to make and sell articles in Second Schedule; (ii) right to make and dispense ***on prescription only*** articles not scheduled or authorised, or I.M.S. subject to Regulations and Conditions in para. 4. Application may also include request for authority to use I.M.S. in making other articles or for other specified purposes.

3. Permits received from methylators must be kept and delivered to Officer. M.S. must not be purified, except with special sanction. M.S. must be kept under proper control. All containers to be labelled 'For external use only,' or 'Not to be taken,' or otherwise to the same effect. Return to be made once a year.

4. Articles ***not in the Second Schedule or authorised*** may be supplied only on the following conditions:—

(i.) Dispensed only on ***signed order*** or prescription by medical practitioner, dentist, or veterinary surgeon.

(ii.) A prescription or order for I.M.S. diluted or undiluted must specify the ***quantity*** required, must ***not be acted on more than once,*** or ***more than 7 days after date*** borne, and, unless issued under N.H.I. to be kept for two years.

(iii.) Articles made with I.M.S. on prescription ***not*** issued under N.H.I. must be entered in ***Prescription Book*** with name of person for whom prescription is written and person by whom signed. Prescriptions according to formulæ given in any ***recognised book of reference*** may be quoted by the ***recognised short title*** (***e.g., 'E.P.'***).

(iv.) Not more than ***1 pint*** of I.M.S. alone, or diluted, or as an ingredient may be supplied at one time to any one person.

(v.) Containers to be labelled.

SECOND SCHEDULE TO REGULATIONS includes **Collodions Liniments, Tinctures, B.P. and B.P.C.**, etc., for external use only, **Extracts** and N.H.I. and R.P.U. Formulary, and **Varnishes,** etc.

NOTICE NO. 55 (WHITE COLOUR).—***Applicable to doctors, dentists, veterinary surgeons, hospitals, and nursing homes.***

1. Medical men, etc., may obtain authority to receive I.M.S.

2. I.M.S. (95% Ethyl Alcohol denatured with 5% Wood Naphtha) may

be had in various strengths, including a strength corresponding to absolute Alcohol.

3. From a methylator ***not less than 5 gallons,*** or from an authorised wholesale or dispensing chemist not more than ***4 gallons*** may be obtained at one time, and official requisition must be sent.

4. ***Without authority*** he may obtain ½ ***gallon*** from a chemist.

5. I.M.S. may be used for dispensing or be used without admixture for any medical, etc., purposes *only*.

6. Must be labelled 'For external use,' or 'Not to be taken,' or words to that effect.

Only 1 pint may be dispensed by a medical man, etc., either alone or as an ingredient, at one time for any one person.

Reference.—P.J. ii./30,512.

The conditions as to quantities and 'For external use,' or 'Not to be taken,' might have been inserted in the Regulations themselves.—L. ii./30,1134; B.M.J. ii./30,966.

Industrial Methylated Spirit is permitted for making Dry or Solid Extracts in new B.P.

Perfume Manufacture.—I.M.S. may be used with permission.

'Regulation 10.'—No. 10, S.R. & O., 1925, No. 1240, *i.e.*, of the Methylated Spirits Regulations 1925 is thus superseded by the 1930 Regulations. For details of the 1925 Regulations, *see* Edn. XIX., p. 121.

A further short-lived permission by the Commissioners of Customs and Excise was:—

'Surgical' Spirit.—This type of Spirit was Industrial Methylated Spirit pyridinised, suitably denatured, employing an approved formula.

The following has been used: Castor Oil ½ ounce, Boric Acid 1⅗ drachms, Industrial Methylated Spirit to 1 pint.

No prescription is necessary, and if supplies are obtained from a wholesale house it is unnecessary for the retailer to keep records of the sale of Surgical Spirit. *Any* desired quantity may be sold.

Surgical Spirit may not be used as a base in the manufacture of other preparations. It must be sold exactly as received from a wholesaler.—P.J. i./26,323,536.

Further ref.—B.M.J. i./25,316.

The new Methylated Spirits Regulations properly appreciated, render Surgical Spirit unnecessary.

Alcoholic poisoning due to application of Surgical Spirit as a dressing prior to operation.—Vincent C. James, B.M.J. i./31,539.

French Polish or Finish (Spirit Varnish).

Industrial M.S. may be used in making for sale: (*a*) Mixtures containing not less than 8 ounces of resin (or 6 ounces of Commercial Shellac) to the gallon, (*b*) hot lacquers, irrespective of the proportion of resin (if not less than 3 ounces).

Mineralised M.S.. may be used in making **Finish** for which the minimum of 3 ounces of gum resin is required.

Mixtures (except hot lacquers) containing 3 ounces or more but less than 8 ounces (or 6 ounces if the resin is Commercial Shellac) to the gallon, must, if for sale, be made with I.M.S. (Pyridinised).

"Power-Methylated Spirits" was introduced in the Finance Bill, 1920.

N. Ireland Methylated Spirits and Ether Regulations, 1928—see Vol. II.

Duty Free Alcohol, other than Mineralised and Industrail Methylated Spirit, is obtainable by permission of the Commissioners for use in any art or manufacture in which the spirit is required and where it is proved to their satisfaction that Methylated Spirit is unsuitable or detrimental, such as manufacture of esters, also for use by hospitals, schools, chemists, or other scientific workers for use in research or teaching. A bond must be given and the *attendance*

of a Revenue officer to witness the denaturing of such supplies is requisite.—Commissioners of Customs and Excise, per P.J. i./15,34. *See also* P.J. ii./14,316,339.

Alcohol 75% (about 5 volumes of 90%, or of Methylated Spirit, to 1 of Water) is used for sterilising the skin and instruments.

Denaturalised spirit in Germany contains 2½% of a mixture of wood spirit 80 parts, pyridine bases 20 parts. (This amounts to 0·5% 'Pyridine' as in our new (1924) Methylated Spirit.)

U.S. gives a method of detecting Methyl Alcohol.

Lotio Evaporans, St. M.'s. H. Methylated Spirit 1 drachm, Solution of Ammonium Acetate 1 drachm, Water to 1 ounce.

Antidotes.—In America, poisoning by so-called deodorised spirit is common. In acute poisoning treat by rectal injections and stomach pump. Give brandy, strychnine or coffee.

Further, for the subsequent amaurosis give pilocarpine and potassium iodide, and later strychnine hypodermically or *per os.*

Treatment: Pilocarpine sweats with Potassium Iodide or Sodium Salicylate in the early stages and full doses of Strychnine hypodermically when optic atrophy sets in.—B.M.J. ii./06,1855.

ALCOHOL ISOPROPYLICUM.

Syn. Secondary Propyl Alcohol, Dimethyl Carbinol, Avantine, $CH_3.CH(OH).CH_3$=60·0624.

Iso-propyl Alcohol Regulations, 1927.

Manufacturers, sellers and users of Iso-propyl Alcohol in Great Britain and Northern Ireland must render a six-monthly return to the Customs and Excise authorities, showing the quantity manufactured, used, and/or sold, together with the names of purchasers, and the purposes for which the Alcohol has been used.

A colourless liquid with spirituous odour and somewhat burning taste. In the anhydrous condition it has Sp. Gr. 0·789 at 15·6° C. and B.pt. 82·4° C. Commercially, it is available admixed with water. A mixture containing 95% to 96% of the Alcohol has Sp. Gr. 0·810. [Our examination of the 95% article (British made) of commerce showed Sp. Gr. 0·8135. It distilled chiefly at 81° C.]. It is miscible with water or Ethyl Alcohol in all proportions.

Preparation.—It may be made on synthetic lines, *e.g.*, by reducing Acetone, using Sodium Amalgam or by passing Acetone and Hydrogen over a metallic catalyst, or by treating Propylene, in the Petroleum Industry. The latter is less pure and considerably more pungent, *vide Vol. II.*

Production as a by-product of the Petroleum Industry in the U.S.A. The method is to absorb the olefine gases, containing Propylene, in Sulphuric Acid and hydrolise the resulting Alkyl-sulphuric Acids:

$$CH_3.CH:CH_2 + H_2SO_4 = CH_3.CH(OSO_3H).CH_3$$

Propylene — Isopropyl Sulphuric Acid.

$$CH_3.CH(OSO_3H).CH_3 + H_2O = CH_3.CH(OH).CH_3 + H_2SO_4.$$

The rectified product contains 91% of the Alcohol and Sp. Gr. 0·819. It cannot be concentrated by simple distillation beyond a certain point, but with dry Caustic Soda it can be made anhydrous.—H. D. Grant and C. O. Johns.—Am. Jl. Ph., June, 1922, P.J. ii./22,272.

Chemical Examination.—Iso-propyl Alcohol, unless supplied as a commercial one, should be free from Acetone, Petrol hydrocarbons, leave no residue on evaporation and contain no added perfume. The Petrol product of commerce certainly has a Petrol odour and taste.

To test for Acetone employ Rothera's Test, vide Vol. II, q. v. also for detection of Isopropyl Alcohol.

Pharmacology.—Isopropyl Alcohol is twice as toxic as Ethyl Alcohol intravenously in cats. Vapour of Isopropyl Alcohol did not kill rats exposed to fumes (*cf.* Methyl Alcohol). 50 Cc. given *per os* to a dog weighing 6·5 kilo. caused serious incoordination, but the animal completely recovered. Applied to wounds in concentration up to 50% allowed same to heal normally.—P.J. i./22,272.

It is stated to be less toxic than *n.*-Propyl Alcohol. Administration by mouth produces narcosis, in larger doses anæsthesia, finally coma and death. Very little is absorbed by inhalation or through the skin.—J.C.S.A., 1922,1093.

Uses.—It is safe internally in small doses in dilute form, and should be useful to make tinctures of drugs. It has been suggested as a surgical antiseptic and could, no doubt, replace Ethyl Alcohol in many surgical and medical procedures. In commerce, it is also suited as a solvent for crystallising and extract manufacture. (Note:—Its boiling point is only 2° to 3° higher than Ethyl Alcohol), and it has the advantage in perfumery in which it is now largely used, and in the culinary arts (flavouring essences) in avoiding excise regulations. A return has to be made annually.

Externally, it has been found harmless to the skin and hair, and within reason it can be inhaled mixed with air.

Acne of the face, complicated with severe seborrhœa, treated by 35% solution two or three times a day. Non-irritating—also good in prurigo, pityriasis and seborrhœa of the head.—B.M.J.E. ii./21,85.

The above remarks apply, it should be noted, to isopropyl Alcohol. The isomeric NORMAL PROPYL ALCOHOL (*Syn. Primary*) $CH_3.CH_2.CH_2.OH$ *obtained from fusel oil is more toxic and unsuited for making tinctures and the like.*

'Isopropyl' Tinctures and **Spirits.**—We made and examined (1923-24) samples of the following, keeping the content of active ingredients the same as those in the *B.P.* '14 Tinctures, and assaying where necessary. In each case the brand known as 'Avantine' was used.

The object was to determine whether Isopropyl Alcohol has a power equal to Ethyl Alcohol to extract the drugs. The percentages of extractive 'Residue' obtained in our laboratories are arranged beside similar data recently obtained in respect of *B.P.* '14 Tinctures.

To those conversant with this type of work, these figures are evidence of the suitability of Isopropyl Alcohol—the slight differences in figures as compared with the *B.P.* '14 Tincture figures are justifiable. It is of interest to remark that few figures for 'Extractives' have been published in respect of the 1914 B.P. Tinctures, while in past years, as applying to the '98 and '85 Tinctures, the subject was much discussed by Pharmaceutical chemical houses, and in passing, we may add that *B.P.* '14 Tinctures made with authentic samples of drugs yield very considerable differences in extractive content.

ISOPROPYL TINCTURES.

Tinctura.	Strength used %.	% Extractive Residue.	% Extractive Residue from *B.P.* '14 Tincture.
Asafetidæ	70	8·5	9·8
Aurantii	90	3·6	2·7
Benzoini Composita.	90	18·2	17·1
Calumbæ	60	1·0	1·5
Camphoræ Comp. ..	60	Satisfactory solution	
Cantharidini. ..	90	Satisfactory solution	
Capsici	60	1·6	0·6
Cinchonæ Comp. ..	70	3·9	4·4
Colchici	70	2·7	2·3
Ergotæ Ammoniata	60	4·4	4·0
Guaiaci Ammon. ..	90	15·1	17·0
Hyoscyami	70	2·4	2·5
Iodi Fortis.	90	Satisfactory solution	
,, Mitis.	90	Satisfactory solution	
Limonis	90	2·1	2·3
Nucis Vomicæ ..	90	Satisfactory solution	
Pruni Virg.	90	15·0	13·0
Quininæ Ammon. ..	60	Satisfactory solution	
Tolutana.	90	8·1	9·0
Valerianæ Ammon.	60	2·8	3·4
Belladonnæ	70	The alkaloidal content of the strong tinctures made by *B.P.* '14 directions, but using isopropyl Alcohol is amply sufficient to allow of dilution to *B.P.* 14 strength.	
Cinchonæ	70		
Opii	90		

All these tinctures resemble the *B.P.* '14 preparations with the exception of a slight distinctive taste; this is not noticeable when the preparations are diluted. The characteristic smell of the freshly prepared tinctures due to the isopropyl alcohol, entirely disappears after about 4 to 6 weeks.

ISOPROPYL SPIRITS.

Spiritus.	Strength.	
Ætheris...	1 in 3	Sp. Gr. within *B.P.* '14 limits.
Anisi	1 ,, 10	See Notes below.
Cajuputi.	1 ,, 10	
Camphoræ.	1 ,, 10	
Chloroformi.	1 ,, 20	
Cinnamomi	1 ,, 10	
Juniperi.	1 ,, 10	
Lavandulæ.	1 ,, 10	
Menthæ Piperitæ.	1 ,, 10	
Myristicæ.	1 ,, 10	
Rosmarini.	1 ,, 10	

All the above dissolved easily and gave good, clear solutions except Spiritus Juniperi. All appear to be miscible with Isopropyl alcohol in all proportions except Spiritus Juniperi and Spiritus Myristicæ.

Iso-propyl Alcohol is therefore a suitable menstruum and solvent and can be used to replace Ethyl Alcohol for drug extraction and for dissolving volatile oils.

The procedures are at present illegal for *B.P.* '14 preparations.

ALDEHYDA.

Aldehydum Absolutum. *Syn.* **Acetaldehyde** $CH_3.COH = 44{\cdot}0312$.

A colourless mobile liquid, irritating when inhaled. Sp. Gr. 0·7876 at 16° C. B.pt. 21° C. Becomes acid on keeping exposed to air—oxidation to acetic acid. Polymerises with rapidity in presence of sulphuric acid at atmospheric temperature into paraldehyde (*vide infra*), but if temperature be below 0° C. crystalline **metaldehyde** is formed.

Aldehydum Dilutum.

Contains 15% in Alcohol, is neutral to test paper, and has an ethereal suffocating odour, producing spasm of the glottis when respired. Diluted 1 in 1,000 with water at 140° F. has been used as inhalation in catarrh and ozœna.

Paraldehydum $(CH_3.COH)_3 = 132{\cdot}0936$. (*B.P.*' 14.), U.S., P. Ital. V., F.E. VIII.

Dose.—30 to 120 minims (**2 to 8 Cc.**), or more, in diluted syrup or almond mixture, repeated if needed in $\frac{1}{2}$ an hour. (In the knowledge of the writers $\frac{1}{2}$ ounce has been given—this is probably a maximum single dose.)

A colourless liquid, crystallizing below 50° F.; Sp. Gr. 0·998, may be obtained by treating Aldehyde with dilute sulphuric acid.

Soluble 1 in 10 of Water and in all proportions in alcohol 90%.

Caution.—Paraldehyde is liable to be converted into ***Glacial Acetic Acid.*** Even a trace may act as a catalyst for more forming. Keep in stoppered bottle.—R. Hutchison, B.M.J. i./30,718.

Uses.—As a sedative and hypnotic, but without action on the heart. In spasmodic asthma it relieves spasm and induces sleep.

Per rectum and intravenously it is an anæsthetic and hypnotic, *v. postea.*

It is diuretic. It sometimes produces rash and digestive disturbances, and slight excitement.

A case is recorded of three and a half ounces taken in error; 9 hours afterwards strychnine hypodermically and ammonia applied and injected; recovered consciousness in 34 hours. Two ounces have proved fatal.—W. W. W.

In delirium tremens 100 minims is a safe hypnotic.—Whitla.

Flavoring.—Prescribed as Elixir or Mistura Paraldehydi, *q.v.* Extractum Glycyrrhizæ Liquidum covers the taste.

Elixir Paraldehydi.

Dose.—1 to 3 drachms (**4 to 12 Cc.**).

Paraldehyde 240, Glycerin 240, Alcohol (90%) 480, Oil of Cinnamon 4, Oil of Bitter Orange 8, Saccharin 1.

Strictly speaking, however, alcohol is physiologically incompatible with paraldehyde.

Mistura Paraldehydi.

Paraldehyde 2 drachms, Essential Oil of Almonds (*sine* Acid. Hydrocyanic) 3 minims, Syrup 1 ounce, Liquid Extract of Liquorice 2 drachms, Water to 4 ounces. This covers the nauseous taste to some extent and forms four doses of $\frac{1}{2}$-drachm or two doses of 1 drachm. The following are preferable:—

Paraldehyde Capsules, 10, 20 and 30 minims.

Dose.—1 or more.

Mistura Paraldehydi et Potassii Iodidi.

Dose.—1 drachm (4 Cc.).

Paraldehyde 1·25, Potassium Iodide 0·92, Liquid Extract of Liquorice 6·25, Water to 100.

In broncho-pneumonia and capillary bronchitis of infants valuable. The constituents of the mixture are incompatible, free Iodine being formed but not sufficient to harm. In severe cases the secretions dry up remarkably.

Rectal Anæsthesia. Paraldehyde 9 drachms—the customary drachm per stone weight—in 5 ounces Olive Oil, for dental operation. Error in copying by a third party, stating 9 ounces, caused death.—L. i./29,247.

Before operations Paraldehyde (per rectum) not very successful.—H. R. Phillips, B.M.J. i./30,279.

Paraldehyde before and after anæsthesia.—R. Francis Matters, B.M.J. i./30, 1112.

Rectal Paraldehyde as preliminary to tonsillectomy in children. Removal of tonsils and adenoids without anæsthesia is practised in Continental Clinics. In this country we are thankful for anæsthetics. Paraldehyde in advance, of value, 1 drachm in 1½ ounces of Saline, neither warm nor cooled, per stone weight, an hour before operation.—M. Sourasky, B.M.J. ii./30,993.

Valuable as a basal hypnotic, per rectum, 1 drachm per stone, given slowly 1½ hours before operation in 10 times its quantity of Normal Saline. Atropine as usual, and Morphine to adults. Specially useful for children.—I. W. Magill, L. i./31,353. Easy to work with on the upper air passages.—C. H. Thomas, *ibid.*, 354.

Intravenously as Anæsthetic.—Deep anæsthesia can be produced. 5 to 15 Cc. mixed with equal quantity of Ether and this mixture dissolved in 150 Cc. of cold solution of Sodium Chloride (1%) in sterile water. Inject the solution cold or at not exceeding 25° C. Minor operations may be performed when 10 Cc. of the chemical have been given, but as it is rapidly excreted by the lungs usually the whole 15 Cc. will be required.—H. L. C. Noel and H. S. Souttar, L. ii./12,818,1221 ; Oliver Atkey, L. i./13,168.

Paraldehyde 1 drachm, Ether 3 drachms, and Liquid Paraffin 4 drachms, given *per os* produced sufficient analgesia to permit of dressing of painful wounds.—J. T. Gwathmey and H. T. Karsner, Jl. A.M.A., April 6th, 1918 ; L. i./18,711.

Metaldehyde.—Usually thought to be a combination of 3 molecules of Acetic Aldehyde, as in the case of Paraldehyde. Made by treating Acetic Aldehyde with a small amount of Sulphuric Acid at a low temperature (below 0° C.).

'*Meta*' is a trade name for compressed Metaldehyde. It is a solid fuel burning with a non-luminous carbon-free flame, used in place of Alcohol, etc. It emits characteristic odour on burning owing to presence of traces of unpolymerised Acetaldehyde.—P.J. ii./26,292.

Poisoning in a boy of 16 through taking 5 Gm. of Metaldehyde. Treatment consisted in giving large doses of alkalis and by controlling the convulsions with Chloral Hydrate and Potassium Bromide.—L. ii./27,670.

Two cases of poisoning in children after eating the tablets in mistake for sweets—acute poisoning of the central nervous system. Treatment : gastric lavage and purge.—B.M.J. i./29,120.

Aldehydum Formicum. H.COH.=30·0156.

Formic Aldehyde in vapour is an active antiseptic, preventing decomposition and fermentation, while it is comparatively non-poisonous.

Liquor Formaldehydi (*B.P.* 14), U.S., P. Belg. IV., Fr. Cx., P. Jap., F.E. VIII., P. Ital. V. *Syn.* Formalin, Formol, Methanal, Methyl Aldehyde Solution.

Patent : A patent was granted 7038/1893 for the 40% solution described as a New Antiseptic material. ***Expired*** 1900.

TRADE MARK: An application to register the word "formalin" was refused in 1900 on the ground that it was the name of the patented article.—C.D.

Dose.—1 minim, *internally*, well diluted.

Wiley gave 0·1 to 0·2 Gm. daily in an investigation.—*Cf.* Vol. II., *Milk Preservatives*.

An aqueous solution of Formic Aldehyde, containing 36 to 38% *w/v*. Sp. Gr. 1·079 to 1·081. (35% by weight=38% by volume.) Assay method by means of sodium hydroxide and hydrogen peroxide is given (*B.P.* '14). P. JAP. has also **Aqua Formalinata** 1 in 35 of the 35% preparation.

Manufacture by oxidation of methyl alcohol by air in conjunction with the catalytic action of Copper Gauze or a Copper couple coated with a film of Silver or Platinum. It is the custom (C.D. Commercial Compendium), to prevent polymerisation, to leave some Methyl Alcohol in the commercial article, which may correspond to Formaldehyde 36, Methyl Alcohol 12, Water 52.

Caution.—A 1% *Solution of Formalin means* 1% *of the Commercial* '40%' *Formaldehyde Solution.* 1% *Solution of Formaldehyde means* 1% *of actual Formaldehyde H.COH.*

Antidotes.—Stomach tube and emetics followed by alkaline drinks, sal volatile (or ammonia in other suitable form), alcohol.

Uses.—For *wound treatment*, and for sterilising surgical instruments, and the hands of operators, *e.g.*, as FORMOSYL, *q.v.* Has been suggested, 1 or 2%, as a pigment and spray for *diphtheria*. Also as Glycerin Pigment 2% to the throat in *angina follicularis*, and as a lotion in *pertussis* 2% or less—with caution. See also Paraform. As compresses to *malignant tumours* 2% or stronger either as palliative, or prior to removal. For *alopecia* 10% or stronger. For *eye washes* $\frac{1}{2}$% has been employed.

It shrivels up soft corns, causing them to drop off if applied daily. Under the name of **Durine** a preparation is made for this purpose.

For a common cold inhalation of 1% will cure.

Ophthalmia, trachoma (1 in 2,000 up to 1% used) and *sweating feet* are well treated by a lotion. *Ringworm, lupus, laryngeal growths* by pigment of 1 to 3 glycerin. A spray or douche is useful for *ozæna* (1 in 2,000 up to 1 in 500 with coarse spray). For puerperal fever uterine injection of 1 ounce of glycerin with 3% of Formalin. Also 1 minim doses *per os* have been practised.

Recurrent pleural effusion has been treated by intrapleural injection of Glycerin 1 ounce, containing 10 drops of Formalin.

Eczema in *dry* form should be treated with moist formalin application, *e.g.*, 1 of formalin (40%) in a starch and water jelly 99.

To eczema that is weeping, apply Lysoform or other formalin dusting powder. Staphylococci of eczema are killed by 1% 'Formalin.'—E. Blake.

Vegetable Infusions.—From 0·05 to 0·1% Formaldehyde is generally adequate to preserve.

For preserving and embalming animal tissues and museum specimens dilute about 10 times—to harden about 25 times, but for preservative purposes a far weaker solution is sufficient.

For Room Disinfection and Utensils (in addition to **sunlight, fresh air and soap and water**) 1 or 2% Formalin as spray (coloured fabrics are not injured), or burn Formalin Disinfecting Tablets, *q.v.*, As a wash, up to 10% solution may be used. For furniture 1% would be suitable. Or simply *evaporate a pint of Formalin per* 1,000 *cub. ft. in an open vessel over a Bunsen or spirit lamp.*

Fumigators are made for room disinfection. They are arranged to be lit at the bottom of the container whilst the fumigator stands on a tray with a little water. Formaldehyde is volatilised into the room and continues to be evolved for ½ hour. Windows, etc., to be pasted down in the usual way where complete disinfection is required, and clothing, etc., left exposed to the vapour for 3 or 4 hours.

Formaldehyde fumigation.—O. L. Crooke, P.J. ii./31,411.

Terminal disinfection during common epidemics "a procedure erroneously founded, almost always useless, and whose practical results bear no adequate relation to the labour and cost involved." Fumigation described by Dr. Andrew Balfour as "undoubtedly a process of camouflage." ***'Current' disinfection,*** *i.e.*, sterilisation of articles soiled by patient's excreta, and prompt disposal of excreta themselves, of more value.—Prof. Chagas, L. i./28,922.

See also Paraform.

For the use of **Formalin with Potassium Permanganate** *for Room Disinfection and for purifying utensils, also as Preservative of Foods, also for the Detection in Milk, Urine, etc., and for Method of Determination and its General Antiseptic Power, see Vol. II.*

References to Medicinal Use of Formalin

Acute Endometritis has been treated by injecting 50% solution of Formalin into the uterus and washing out again quickly. Not so dangerous as Zinc Chloride.

Epithelioma on the face has been treated with Formalin after using Cocaine. The treatment is repeated after four days—the scab comes off and the surface below cicatrises rapidly. There is no local reaction, but the method is only suitable for epithelioma not larger than a florin. A solution of 2% Formaldehyde is valuable in extensive and inoperable cases. It causes necrosis and elimination of neoplastic bodies without irritating healthy adjacent tissue or causing pain.

Aphthous Ulcerations of the buccal mucous membrane may be washed with a tampon soaked in Formalin. *Use Cocaine first.*

Ringworm can be cured by painting with it, keeping the patch of skin in such a position that the solution will not run off it. One painting usually suffices. If skin greasy wash with Spirit first. May smart a little but otherwise rapid, clean and effective. Second application may be repeated in five days' time.

Tuberculous Empyema treated by injecting Formaldehyde-Glycerin (2% Formaldehyde in glycerin). After removal of purulent material 1 to 12 ounces of this solution employed.—L. ii./21,770.

Bacillary Dysentery treated by rectal injections of Formalin, 300 Cc. of 1% twice daily. Painful.—Schiff, Abst. Pres., Oct., 20,355.

Sensitisation with Formalin in a medical student. Desensitisation by injections of 1 Cc. of 1 of Formalin in 1,000,000, then 2 Cc., and later 4 Cc. Rash disappeared.—H. MacCormac, B.M.J. ii./25,731.

Formaldehyde Poisoning by drinking 3 ounces of 4% Formaldehyde. Unconsciousness occurred in three minutes. Treatment consisted in washing out the stomach with strong Saline Solution and later with a Solution of Ammonium Acetate. At the post mortem examination it was found that the interior of the œsophagus and stomach was extremely corroded.—B.M.J. ii./12,350,1470.

Poisoning of a boy, aged 7, treated by washing out the stomach and then giving a quantity of very dilute Ammonia, as an attempt to produce Hexamine with the Formaldehyde. An uneventful recovery was made.—B.M.J. ii./27,687.

Preparations of Formaldehyde

Collutorium Formalini, R.D.H.

Formaldehyde Solution 18 minims, Peppermint Oil 5 minims, Alcohol (90%) 1½ drachms, Peppermint Water to 1 ounce. Half a teaspoonful to a tumbler of water for use.

Gargarisma Formaldehydi.

Formalin Solution 1 minim to Water 1 ounce.

Nebula Formaldehydi.—C. Muthu's Inhalants.

Inhalant 'A.'—Chloroform 1 drachm, Menthol 10 grains, Pumilio Pine Oil 10 minims, Alcohol (90%) to 1 ounce, with 2½% Formaldehyde (in the form of gas). **'B.'**—Guaiacol 1 drachm, Chloroform 1 drachm, Menthol 15 grains, Pumilio Pine Oil 15 minims, Alcohol (90%) to 1 ounce with 5% Formaldehyde. **'C.'**—Guaiacol 2 drachms, Chloroform 2 drachms, Menthol 15 grains, Pumilio Pine Oil 15 minims, Terebene 1 drachm, Alcohol (90%) to 1 ounce. **'D.'**—Guaiacol 2 drachms, Iodine 1 drachm, Terebene 1 drachm, Pumilio Pine Oil 15 minims, Chloroform 2 drachms, Alcohol to 1 ounce.

Dose.—About 10 drops of one of the above sprinkled on the inhaler every half to one hour, and used by continuous inhalation.

These inhalations are used progressively. After reaching 'C,' 'D.' is used as an alternate Solution or for night use.

About 50% of phthisical patients treated are stated to have recovered under the treatment.

Strengths of Formalin admissible for Inhalation.

A plain 1% mixture of Commercial Formalin in 90% Alcohol (*i.e.*, without Chloroform, etc.) is, we find, tolerated without being too irritating to the throat and nostrils. A 5% mixture is too irritating for prolonged use by inhalation. A 10% mixture is out of the question.

All the above were tried in an ordinary Burney Yeo Inhaler.

Formalin and Chloroform Solutions :—

No. 1. Formalin 5, Chloroform 15, Alcohol (90%) 80.

No. 2. Formalin 10, Chloroform 20, Alcohol (90%) 70.

No. 2 is only ventured upon where Formalin is well and easily endured. In the absence of the anæsthetic effect of the Chloroform patients were not able to bear even the mild preparation for any length of time. Results in phthisis encouraging.—H. Collier.

Formanilid. $C_6H_5NH.COH = 121{\cdot}0626$. *Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**). Hypodermically 15 minims (**1 Cc.**) of 3% solution. Yellowish crystals soluble in water and alcohol, melting at 46° C. Employed in hæmorrhage and fevers. 20% solution said to produce local anæsthesia in 1 hour. 2 to 3% for urethral discharge.—M. Am., 1907. To be distinguished from Formamid, $HCO.NH_2$.

***Formosyl** (T.M. 293326).—A liquid formaldehyde potash soap. It is highly antiseptic, relatively non-poisonous, inodorous, deodorant and cheap ; does not coagulate albumin, and is miscible with water and alcohol in all proportions. It combines the penetrating lathering action of soap with the antiseptic power of Formalin. A 2% solution is sufficient for general purposes and is better freshly prepared. For hand disinfection 1 to 2% is suitable. The stock bottles should be kept well corked.

A 5% solution is rapidly fatal to *B. typhi abdominalis*, *B. coli communis*, and *Staphylococcus pyogenes aureus*, and a 3% solution destroys *B. anthracis* spores in 24 hours.

Uses.—In using warm solutions a temperature of 45° C. should not be exceeded; ½ to 1% is suitable for irrigation of the vagina, uterus, abscess cavities, etc. Diluted it is useful for psoriasis, lupus, eczema, and as a wash for perspiring feet. Impetigo may be treated with 5% **ointment** combined with carbolic acid and ammoniated mercury, or same strength with zinc ointment (paraffin basis) for eczema. 25 to 50% ointments with lanolin basis are applied to ringworm and alopecia areata. A 10% **ointment** is used in psoriasis. 20 to 30% may be used to arrest sweating of the feet where of limited area. For seborrhœa a 10% ointment with 5% resorcin is useful. 10 to 15% in gall ointment is suitable for piles.

In the sick room and operating theatre its deodorant properties will be evident. It cleanses suppurating wounds and has styptic action on bleeding surfaces. Two to 5% is also suitable for bites, stings and burns. It is valuable also for general household disinfection, for deodorisation and cleaning. Good results have been obtained with it in veterinary use.

***Formosyl Mouth Wash.** An efficient antiseptic, agreeably flavoured. A small teaspoonful is added to a tumbler of water for use.

Dermatologists who treat the skin with lotions and ointments and leave the state of the mouth unattended to, are proceeding on unscientific lines. Eruptions on the head and face are frequently found in conjunction with an unhealthy condition of the teeth and gums.

Thymaglycin is an alkaline mouth wash which may be mentioned.

***Formosyl Gargle.** Contains Formalin, Phenol, Boric Acid, Essential Oils, etc. An antiseptic preparation for use as a *gargle* or mouth wash.—1 tablespoonful with an equal quantity of water (preferably warm).

As Nasal Douche.—Dilute four to eight times.

The commonest avenue of rheumatic infection is the tonsil and next to it the nose. Irrigation and thorough cleansing of the nose and pharynx with an antiseptic lotion is essential routine in anti-rheumatic treatment. The paper entitled 'The Avenues of Rheumatic Infection' is the outcome of examination of 75 cases of Sydenham's chorea. Of these 88% showed nasal and pharyngeal inflammations.—W. P. S. Branson, B.M.J. ii./12,1432.

***Formosyl Tooth Paste, Tooth Soap, Tooth Powder, Dusting Powder** (for moist surfaces, bed sores and ulcers) are prepared, also **Pessaries** of Cacao Butter, containing 2 grains each.

***Formosyl Dental Dressing** in paste form is prepared containing 6% Cocaine.

***Formosyl Pastils** are useful to allay irritation and are antiseptic.

Liquor Formaldehydi Saponatus (*B.P.* '14), contains 20% of Formaldehyde Solution.

Formalinsåpa, Terpinoform P. Svec. X.

Terpineol 5, Alcohol 90% 20, Soft Soap 40, Formaldehyde Solution 35. A pleasant, fragrant antiseptic preparation.

***Cromessol** (T.M. 397289). An antiseptic containing Formalin and essential oils. Has germicidal powers equalling Carbolic Acid. Lice do not live more than 6 hours after being sprayed with it.—L. ii./26,1118.

Morestin's Fluid.

Dose.—1 to 4 Cc. injected drop by drop into the not completely evacuated sac.

A mixture of Formalin, Glycerin, and Alcohol equal parts.

In the treatment of hydrocele it is generally not painful. After a few hours the scrotum swells, becomes heavy and oedematous and some liquid reforms, but this is reabsorbed. Iodine has been used in children (congenital hydrocele), but is dangerous.—St. George B. Delisle Gray, B.M.J. i./30,649, 726 (correction).

***Yadil** (T.M. 371511, Class 3, and 37152, Class 48).

Syn. **'Tri-Methanal-Allyl Carbide.'**

A water-white liquid having a slight allyl odour and a sweetish and pungent taste like Formalin. Sp. gr. 1·015. Neutral or very faintly acid.

Uses.—An antiseptic solution employed as a deodoriser and bactericide locally. For external use employ 1 in 300 as nasal spray, gargle or wash for offensive perspiration. 'Has been used for impetigo, acne, erysipelas, eczema and chilblains. For enemas and vaginal douches 1 in 150. For instruments 1 in 80.

Sir W. J. Pope found about 1% Formaldehyde, 4% Glycerin, with a minute quantity of either garlic or mustard oil. Prof. Dixon made indictments regarding its advertisement for cure of phthisis.—*Daily Mail*, July 22 and 23, 1924. It is very weak relatively to Carbolic Acid.—J. Eyre, *ibid.* July 26, 24.

***Paraform** (T.M. 216093) **Paraformic Aldehyde, Tri-oxy-methylene,** Fr. Cx. **Formaldehydum Polymerisatum, P. Belg. IV.,** U.S.X., F.E. VIII. $(H.COH)_3$.

Manufacture.—On evaporating aqueous Formaldehyde solution, the polymer Paraform $(H.COH)n$ throws out, which, on drying, changes to $(H.COH)_3$. White amorphous masses, slightly soluble in water, with an irritating vapour especially on heating, when Formaldehyde is formed.

Room Disinfection : Tablets of Paraform 1 gramme, **Formalin-Disinfecting Tablets,** are used in a vaporiser or with a night light,—20 to 25 tablets per 1,000 cubic feet, the latter number ensuring thorough disinfection. Walls and furniture should first be sprayed with water.

They are also prepared of strength 0·1, 0·25 and 0·5 Gm.

The use of 20 Gm. of Paraform or an equivalent of Formalin Solution, *i.e.*, 1¾ ounces of the 40% article, killed *B. typhosus* by two hours exposure. Mixed vapours of Sulphur Dioxide and Formaldehyde may have advantages to destroy, in addition to bacteria, vermin such as moths, fleas and bugs. The efficacy of Sulphur Dioxide, particularly when in association with aqueous vapour, was also clearly re-established.—C. T. Kingzett, H. F. Bottomley and J. E. Brimley, M.P.C. i./17,157.

Sick-room disinfection. Spring-cleaning alone is not adequate. The 'poisonous' 3% Phenol preparations sold by grocers, etc., are criticised, *cf.* our p. 27.—H. R. Kenwood, L. i./26,1055.

Terminal disinfection of premises after infectious disease is being regarded with increasing scepticism. It was dropped in Rio de Janeiro in 1920 without untoward results.—L. ii./26,610. See also Andrew Balfour, our p. 124.

Catheters may be maintained aseptic by wrapping in lint impregnated with 20% of paraform.

Dental Use.—Paraform, for the induction of painless dentine drilling is mixed with Harvard Cement in the proportion of 1 to 20 and then made into a fairly firm mass with the fluid. If left in the cavity from 1—3 months the cavity may be shaped without any pain to the patient. In addition, the slow emanation of formaldehyde gas over a lengthy period most probably arrests the process of decay. The cement should not be placed closer than half way to the nearest point of the pulp.—E. Clayton, Trans. Brit. Soc. Dental Surgeons, 1925, No. 1, p. 33.

Paraform Collodion, 25% strength, applied three times a day to warts is efficacious.

Whooping-cough has been treated by inhalation of Formalin vapour—*i.e.*, from Paraform.

Insufflatio Paraformi. *Syn.* PARAFORM SNUFF.—Paraform 40, Ammonium Chloride 20, Lavender Oil 0·2, Menthol 0·5, Lycopodium to 100. This preparation should prove a useful nasal antiseptic. We found that Paraform as such, undiluted, can be tolerated by the nostrils without causing irritation or sneezing. If sneezing is undesirable the Ammonium Chloride must be omitted, also the Paraform may be reduced if preferred.

Mixtures of Paraform with Sodium, Barium or Strontium Peroxide, when brought into contact with water, yield formaldehyde vapour.

Pasta Formalini, R.D.H. Powder Thymol 1 drachm, and add Paraform 3 grains, Glycerin 10 minims, Zinc Oxide 2 drachms.

Formaldehyde Tablets for **internal** administration contain Paraform ¼ grain, Milk Sugar 2 grains, Citric Acid, Peppermint and Sugar, *q.s.* to 10 grains. Useful antiseptic to the mouth.

✱**Formamint** (T.M. 335409 Class 3 Assoctd., Formamint Wulfing 301695 Assoctd.) **Tablets** are said to contain 0·01 Gm. 'Formaldehyde.'

Furfural $C_5H_4O_2 = 96·0312$. *Syn.* FURFUROL, PYROMUCIC ALDEHYDE, ARTIFICIAL OIL OF ANTS.

A liquid of aromatic odour, colourless but turning red on exposure to light. Manufactured by distilling various Cellulose fibres, wood, straw, etc., with dilute Hydrochloric or Sulphuric Acid. In U.S.A. corncobs or oat hulls are used. It is used in making synthetic Resins or Rubber substitutes.—C. D. Comm. Compendium.

ALKALOIDAL NOTES.

'ACTIVATED' ALKALOIDAL SOLUTIONS.

Alkaloidal salts in presence of alkali have increased activity and toxicity. An example is the clinical use of 0·5% Cocaine Hydrochloride solution with the addition of 0·5% Sodium Bicarbonate (*cf.* **Injectio Cocainæ et Sodii Bicarbonatis**), which is stated to be more efficacious and anæsthetic than even a 4 or 5% plain Cocaine Hydrochloride solution. Other alkaloids, *e.g.*, Morphine and Quinine, behave similarly (for further details *v.* 18th Edition, p. 141).

This effect we ascribe to the presence in solution of some of the *alkaloidal base.* It can be shown that many alkaloidal salt solutions, on making neutral or slightly alkaline, give no precipitate and yet contain alkaloidal base which can be extracted. From considerations

of solubility, all the alkaloid can not be present as base, and we believe these solutions to contain an equilibrium mixture of base and salt. Removal of the base, *e.g.*, with a solvent (or by *absorption, in vivo*) favours the further and complete decomposition of the salt. If this explanation of the 'activation' is correct, it implies that the alkaloid itself is more readily absorbed by the tissues than is a corresponding salt.

We have shown in the cases of Cocaine, Quinine, and Strychnine Hydrochlorides that a solution in contact with blood contains free base. This is in agreement with the suggestion of Overton (Ztschr. f. Physikal Chemie, 1897, p. 207), that, in the organism, the salts of the alkaloids are split up by the alkali of the blood and lymph, their action being due only to the free alkaloids. In support of this view, there are also the observations of Gros (Arch. f. exp. Path. u. Pharm., 1910, p. 80), who compared the anæsthetic effect of some bases and their salts, and in nearly every instance the base was shown to be considerably more active.

Some suggest a loose state of combination between the alkaloids and blood serum constituents.

The following are our conclusions :

(*a*) On injection, all alkaloidal salt solutions, before having physiological effect, *must be decomposed by the alkalinity of the blood, with the production of free base.*

(*b*) Alkaloidal salt solutions containing alkali are more active than those of the salt alone, since they already contain free alkaloidal base in solution.

Basic Alkaloidal Preparations.

The following preparations are the result of attempts to apply in practice the idea that the alkaloidal base is more active than its salts.

***Borocaine** (T.M. 459625).—This is Novocain (Ethocaine) Borate, first examined in 1912 by Gros (Arch f. exp. Path. u. Pharm., 1912, p. 132), who found it to have the greatest anæsthetic effect of the five Novocain salts tested. The borates, being the salts of a very weak acid, are readily hydrolised, so that their aqueous solutions contain alkaloidal base.

The compound was reintroduced by Copeland and Notton (B.M.J i./25,547), who found it superior to Cocaine and other Cocaine substitutes. (*See Novocain for further on this compound.*)

Addition of Sodium or Potassium Bicarbonate to Novocain solution renders it almost equal to Cocaine in mucous membrane anæsthesia.—W. R. Meeker Jl. Lab. & Clin. Med., Nov. '25,139, per Pres., Apl. '26,146.

Quinine-Mannitol.—A concentrated solution containing Quinine base, Boric Acid, and Mannitol, suggested for intracutaneous or intravenous injection in place of the acid salts of Quinine at present in use. (For further details of composition, dose and toxicity, see Quinine Chapter, *post.*) On dilution with water or blood, the solution becomes slightly alkaline, owing to the liberation of Quinine base by hydrolysis.—W. H. Martindale, L. i./26,455.

***Steriloids** (T.M. 260647) **of Alkaloidal Bases.**—These are solutions of alkaloidal bases in suitable solvents. Owing to limita-

tions of solubility, they contain only small amounts of alkaloid, and yet in some instances, *e.g.*, with Atropine and Morphine, they have been found as effective as much larger doses of the corresponding salts (*v. infra*).

✱ **'Steriloids.'** Prepared with 2 Cc. (except where stated) of *No.* 1 *solvent* (1% Sodium Chloride) of Atropine 1/400, 1/200 and 1/100 grain in 1 Cc.; Cocaine 1/60 grain; Codeine 1/16 grain and ¼ grain; Diamorphine 1/50 grain, 1/30 grain (in 2·5 Cc.); Emetine 1/18 grain; Morphine 1/160 grain; Quinidine 1/60 grain; Strychnine 1/360 grain in ½ Cc., 1/180 grain in 1 Cc., and 1/90 grain.

✱ **'Steriloids,'** containing 2 Cc. of solution in *No.* 2 *solvent* (5% Glucose) have been made of Cocaine 1/50 grain; Emetine 1/14 grain; Quinidine 1/50 grain; Quinine 1/60 grain.

In like manner **'Steriloids,'** using *No.* 3 *solvent* (1% Sodium Bicarbonate), containing 2 Cc. of the solution, have been made of Cocaine 1/30 grain; Codeine 2/7 grain; Emetine 1/9 grain; Morphine 1/160 grain; but in general we should not favour this solvent.

For the data as to solubilities of alkaloidal bases in these solvents and in water, see Edn. XVIII., Vol. I, p. 143.

Uses.—Prompt effect is produced without calling upon the tissues to break down the medicament injected. The amounts are in some cases small, but the injection can be repeated if desired. There is economy in the chemical and the possibility of overdose is reduced to a minimum. The injection of a *minute* amount of the alkaloidal base, producing a prompt effect of the calibre of a much larger amount of the corresponding alkaloidal *salt*, may be of value in 'withdrawal' treatment. They are outside the provisions of the Dangerous Drug Acts.

Intravenously, these preparations offer considerable possibilities.

Clinical Trials in a small number of surgical cases were made with some of the solutions (in 1924). In particular, the **Atropine Base** in No. 1 Solution was used to check secretion before gas and prior to ether anæsthesia. Doses of 1/400 grain were, as a rule, satisfactory except for very robust patients. It was found necessary to operate within ¾ hour. Atropine 1/400 grain in this basic form was roughly equivalent to 1/100 grain of Atropine Sulphate, given at about the same interval before operation.

The effect with Atropine base passes off more rapidly.

Morphine Base 1/160 grain in No. 1 Solution has been tried after operations where pain follows, both of slight and medium severity. It is remarkable that this small quantity of morphine had some effect: as a rule, sufficient to ensure satisfactory sleep and comfort in women. When used for big men, the patients were restless in coming round from the anæsthetic, but did not, as a rule, complain of pain.

Morphine Base 1/160 grain in half-strength Chloroform Water was also tried with somewhat similar effect. (The usual routine had been Morphine Tartrate ¼ grain after operation.)

Base or salt for injection. An editorial note on the above. —L. i./26,451.

ALKALOIDAL PERIODIDES.

Numerous Alkaloidal Periodides, in addition to Emetine Periodide (*q.v.*) have been made. A paper dealing with the last mentioned was read by the author in conjunction with J. Graham Willmore at the Royal Society of Tropical Medicine and Hygiene, London, in May, 1923. There would seem to be a field of usefulness for these in the light of results obtained with the Emetine compound. The literature on the chemistry of the Periodides is exceedingly meagre. (Ref. : Jl. Pharm, et Chim. '09, 193.) The following are described in the body of the work :—

	Dose.
Cinchonidine Periodide	1½ to 3 grains.
Cocaine ,, ...	1/40 ,, 1/20 ,,
Codeine ,, ...	¼ ,, ½ ,,
Emetine ,, ...	½ ,, 2 ,,
Morphine ,, ...	1/16 to ⅛ ,,
Papaverine ,, ...	½ ,,
Quinidine ,, ...	1½ to 3 ,,
Quinine ,, ...	1½ ,, 3 ,,
Sparteine ,, ...	½ ,, 3 ,,
Strychnine ,, ...	1/100 ,,

Constitution of the Alkaloidal Periodides.

There are two distinct classes of Alkaloidal periodides—those containing hydriodic acid of the type B.HI.I*n*—and those prepared by combination of alkaloid and Iodine only, of the type B.I*n* where B is the alkaloidal base.

The latter true periodides with which we are concerned, vary in their *capability of withstanding* Physiological Acid and *per contra* of *liberating the alkaloidal base* in presence of Physiological Alkali. Those of Codeine, Morphine, Quinidine and Strychnine liberate a considerable percentage to both acid and alkali, while those of Cinchonidine, Emetine and Papaverine eliminate small amounts. On the other hand Cocaine and Quinine Periodides respond markedly to the Alkali. For further consideration and experimental data, see Edn. XVIII, p. 146, and XIX, p. 136.

In making the determinations, 1 Gm. of the periodide was repeatedly shaken with 200 Cc. of 0·2% of Hydrochloric Acid during 4 hours at 40° C. The insoluble residue was then again shaken during 4 hours at 40° C. with 200 Cc. of Physiological Alkali.

The **Physiological Alkali** was a solution containing 1·34% of Sodium Bicarbonate and 1·14% of Sodium Carbonate ($+10H_2O$), as this has a Hydrogen Ion concentration similar to that of the intestinal fluid (pH = 9·5).

Pharmacology and Uses.—For further details see each individual Periodide.

ALOE.

Aloe (*B.P.* '14) is from *A. chinensis* (*Liliaceæ*), and *A. Perryi* and other species, known commercially as Curacao, Socotrine or Zanzibar Aloes. 'Aloe' Fr. Cx., P. Ital. V. and F.E. VIII. (Acíbar) and P. Jap. is from various species. P. Helv. and P. Belg. IV. specify *A. ferox.*

For analytical data on Aloes see Vol. II.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Uses.—Aloes and Aloin act chiefly on the lower bowel. They are employed with soap and with iron and with strychnine in the treatment of habitual constipation.

Aloes, in dose of 10 grains a day, is very unsafe for pregnant women—very likely to produce abortion.—P.J. ii./24,343.

The **Natal** or **Cape** varieties of Aloes (from *A. ferox*) are of vitreous fracture, and characteristic odour, and mostly used for veterinary purposes. They contain as much as 6% Barbaloin.

Extractum Aloes (*B.P.* '14).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

Barbados Aloes yield 60 to 70% of Extract, *cf. Vol. II.*

Decoctum Aloes Compositum (*B.P.* '14).

Dose.—½ to 2 ounces (**15 to 60 Cc.**).

A 1% solution of the Extract, with Myrrh and Potassium Carbonate, Licorice and Compound Tincture of Cardamoms. A purgative and used in amenorrhœa.

Pilula Aloes et Ferri (*B.P.* '14).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Exsiccated Ferrous Sulphate 1, Aloes 2, Compound Cinnamon Powder 3·5, Glucose Syrup 3·5 or *q.s.*

Tablets are also prepared 4 grains each. An excellent remedy for habitual constipation.—W. W. W.

Pilula Triplex. *Dose.*—1 to 3 pills.

Aloes Extract 2 grains, Podophyllin ¼ grain, Mercurial Pill 1 grain, Cathartic with particular action on the liver.

℗Pilula Aloes, Cascara et Hyoscyami.

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Extract of Aloes, Extract of Cascara, Extract of Hyoscyamus, equal parts.

℞Pilula Aloes, Nucis Vomicæ et Belladonnæ.

Extract of Aloes 1, Extract of Nux Vomica ½, Extract of Belladonna ¼. In grains for one pill.

Tinctura Aloes (*B.P.* '98).

Dose.—1½ to 2 drachms (**6 to 8 Cc.**), or ½ to 1 drachm (**1·2 to 4 Cc.**) repeated. Extract of Barbados Aloes 1 in 40.

Pruritus vulvæ,—tampons saturated with this give relief.

Glycerinum Aloes.

Evaporate Aloes Tincture 6 to 3, gradually adding Glycerin 30. Pigment for bed sores and anal fissures.

Dewees' Emmenagogue Mixture (H.).

Dose.—½ ounce thrice daily.

Tincture of Aloes 8, Tincture of Ferric Chloride 6, Tincture of Cantharides 2, Ammoniated Tincture of Guaiacum 3, Syrup to 90. Largely employed in the U.S. in functional and organic amenorrhœa.

Aperitive Elixir. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**)

Tincture of Aloes 2, Tincture of Myrrh 2, Tincture of Saffron 1.

Tinctura Aloes Composita, P. AUSTR.

Average dose.—1 to 2 drachms (**4 to 8 Cc.**).

Cape Aloes 15, Gentian Root 2½, Rhubarb 2½, Zedoary Root 2½, Saffron 2½, Alcohol (70%) 500.

For threadworms, Aloes with carminative in the morning early. After evacuation an enema of 3 tablespoonfuls of salt—repeated during 10 days or so. Avoid salads and watercress.

Pulvis Aloes cum Canella, P. DAN, 1836. *Syn.* HIERA PICRA.

Dose.—3 to 10 grains (**0·3 to 0·6 Gm.**).

Hepatic Aloes 16, White Canella Bark 3. Much used as a domestic emmenagogue.

For insect bites a saturated solution of Aloes in Tincture of Tolu. —F. W. Cock, B.M.J. ii./18,256.

Aloin, $C_{16}H_{16}O_7,3H_2O=374·176$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**). ¼ grain may be considered an aperient, and 1 grain a full purgative dose. The former is U.S. *Average dose.* In a pill with hard soap. Assuming Extract of Aloes to contain 25% of Aloin, it follows that ¼ grain of the latter is equivalent in activity to 1 grain of Extract.

Has been tried as *hypodermic purgative*,—½ grain in warm water 30 minims, but it is not always satisfactory.

A principle obtained officially from Barbados or Socotrine Aloes in odourless yellow crystals, having the characteristic taste of aloes; *soluble* in cold water, 1 in 140 (Barbaloin), in alcohol 90%, 1 in 20, almost insoluble in Ether. Aloes contains as much as 30% of Aloin.

Oxidation of Aloin and of other constituents of aloes with alkali persulphate also by Caro's Acid and Sodium Peroxide.—E. Seel, J.C.S.A. i./20,67 *et seq.*

℞ **Pilula Aloin Composita.**—For constipation, Sir A. Clark recommended aloin, extract of nux vomica, sulphate of iron, myrrh and soap, of each ½ grain in a pill taken ½ hour before last meal of the day. If fæces be hard and there be no special heart weakness add ½ grain of ipecacuanha, and should griping be caused add also ½ grain of extract of belladonna.

℞ **Tablets, Anti-Constipation.**—The above without Ipecac.

℞ **Pilula Aloin, Strychninæ et Belladonnæ.**

Dose.—1 or 2. Aloin ⅕, Strychnine $\frac{1}{60}$, Alcoholic Extract of Belladonna ⅛, in each: in fractions of a grain, make one pill; of a gramme, fifteen pills.

℞ **Tablets of Aloin Compound** represent the latter with Ipecacuanha $\frac{1}{16}$ gr. **Tablets of Aloin** (Plain), $\frac{1}{10}$ and ½ grain.

℞ **Pilulæ Laxativæ Compositæ, U.S. VIII.** 100 pills contain Aloin 1·3, Strychnine 0·05, Extract of Belladonna Leaves 0·8, Ipecacuanha 0·4, Glycyrrhiza 4·6 Gm., Syrup, *q.s.*

Suppositoria.—Fr. Cx. Aloes 0·5 Gm., Cacao Butter 2·5 Gm.

℗ **Pil. Alophen.**
Dose.—1 to 3. A proprietary. Each contains Aloin ¼ grain, Phenolphthalein ½ grain, Ipecacuanha 1/15 grain, Strychnine 1/80 grain, Extract of Belladonna 1/12 grain. For constipation due to torpidity of the lower bowel. Evacuation usually occurs in from 8 to 10 hours.

℗ **Pilula Phenaloin, N.H.I.**
Aloin ¼ grain, Phenolphthalein ½ grain, Strychnine 1/80 grain, Extract of Belladonna 1/12 grain, Ipecacuanha Root Powder 1/15 grain.

℗ **Marienbad Tablets.** Published formula :—Aloes Extract 1·25, Rhubarb 1·25, Podophyllin 0·25, Cascara Extract 0·50, Belladonna Extract 0·12. Divided into 50 tablets, keratined and silvered.—Pres., Mar., 1907.

ALUMINIUM.

Al=26·97.

Aluminium Soldering.—A large number of solders and appropriate fluxes are given.—C.D. ii./07,631.

Thermit is a mixture of powdered Aluminium and magnetic Iron Oxide used in welding Iron and Steel and repairing steel castings.

Duralumin.—An alloy of Aluminium slightly heavier than the pure element. Its strength is about the same as mild steel. Practically non-corrodible. For surgical appliances.—B.M.J. i./12,236.

Aluminium Vessels.—Aluminium is not appreciably acted on in cooking and laboratory work. It is a good conductor of heat. When not in use should be kept perfectly dry.—L. ii.13,54.

Not toxic or detrimental to any biological function when present in diets in concentrations up to 600 parts per million.—L. i./31,596.

Alumen Purificatum (*B.P.* '14) is Aluminium and Potassium Sulphate (Potash Alum) $Al_2(SO_4)_3\,K_2SO_4,\,24H_2O=948{\cdot}7544$, *or* the Ammonium Salt $Al_2(SO_4)_3(NH_4)_2SO_4,\,24H_2O=906{\cdot}5768$.

Dose.— 5 to 10 grains (**0·3 to 0·6 Gm.**).

Soluble 1 in 10 of water.

Uses.—As an astringent for local application. Ulcers on the lips are cured by its use. As a mouth-wash its solution is possibly not desirable unless it be quickly removed by rinsing. Destruction of the teeth may occur.

Injectio Aluminis L.H. for vaginal use. 60 grains in 1 pint.

Injectio Aluminis et Zinci, St. Th. H.
Purified Alum powder 2 parts, Zinc Sulphate powder 1 part. Mix.
One or two teaspoonsful dissolved in 1 pint of warm water for vaginal injection.

Whooping-cough has been treated with 1 to 2 drachm doses of 2% Alum Solution alternate hours—also combined with adequate doses of Chloral Hydrate.—B.M.J.E. i./20,13 ; Pres. Feb./21, p. 110.

Poisoning by Aluminium produces a rather slow intoxication. In a case contracted by a metal worker there was loss of memory, tremor, jerking movements and impaired co-ordination, also chronic constipation and incontinence of urine.—J. Spofforth, L. i./21,1301.

A solution of Alum useful to destroy slugs, snails, and their eggs without harming the plants.—P.J. i./25,638.

Alumen Exsiccatum (*B.P.* '14). *Syn.* Alum Ustum, Burnt Alum, is made by heating Potash Alum until it has lost 45 to 46% of its weight. Also made (U.S.) from Ammonium Alum.

Glycerinum Aluminis (*B.P.* '14). 1 in 6. Astringent throat paint.

Points of Alum, also of **Copper Sulphate,** mounted in wooden cases, are prepared for ophthalmic and other uses.

Aqua Hæmostatica, P. Ital. V., P. Belg. IV. ACQUA DEL PAGLIARI.

Alum (Potash) 80, Benzoin Tincture 10, Benzoic Acid 2, Water to 1,000. Filtered after allowing to deposit. If with 10% Sodium Chloride it is POLLACCI'S modification.

Aluminii Sulphas, *Syn.* ALUMINIUM TRISULPHATE.

$Al_2(SO_4)_3 + 16H_2O = 630{\cdot}3696$.

White crystalline powder or lumps made by dissolving freshly precipitated Aluminium Hydroxide in Sulphuric Acid. ***Soluble*** 1 in 1 of water nearly. Loses about 45·7% water at 200° C.

Incompatible : alkalis and alkaline carbonates.

Liquor Aluminii Acetici, P.G. VI., P. AUSTR., P. JAP. IV. *Syn.* BUROW'S SOLUTION (Burow's Solution, P. Belg. IV. is Liquor Alumii Aceto-Tartratis similar to P. Helv.).

Dissolve Aluminium Sulphate 100 in Water 270 without heat. Filter and add Water to Sp. Gr. 1·15, and while constantly stirring pour in by degrees Precipitated Calcium Carbonate 46, mixed with Water 60, and finally Dilute Acetic Acid (30%) 120 in portions. Set aside in an open dish until gas evolution ceases (P.G. VI. says at least 3 days), stirring frequently, then decant, press the sediment (without washing), filter the solution and dilute to Sp. Gr. 1·044 to 1·048. Contains 7·3 to 8·3% of Basic Aluminium Acetate $Al(C_2H_3O_2)_2OH$.

Uses.—Diluted with twice as much water, thus making a 2½% solution as an antiseptic astringent lotion, and gauze impregnated with a 5% solution is used as a dressing.

1 to 3 of orange flower water forms a pleasant mouth lotion.

Acute otitis externa and media has been treated with the liquor diluted times.

The P.G. Liquor diluted 1 drachm to the ounce forms an approximate 1% solution. It is much used on the Continent in place of Boric Lotion. For moist fomentations and as the medicament for a bath in which to place hand or foot for continuous irrigation. In dermatitis whatever be its cause, in suppurating open wounds, and in cutaneous erysipelas there is nothing to equal fomentation with it. An objection is, however, that after three weeks' continuous irrigation tissues become very hard. Twenty-four hours' immersion in warm normal saline (one drachm to the pint) largely removes the indurated state.—H. F. Waterhouse, B.M.J. ii./10,62.

A 1% solution an effective substitute for Calamine Lotion and in some cases may produce better and quicker therapeutic result.—R. M. B. MacKenna, B.M.J. i./32,78.

Note.—Burow's Solution, Ph. Ned. V., is made by interacting between Potash Alum and Basic Lead Acetate Solution and in consequence contains some Lead Sulphate (0·6%) in solution and some undissolved. It contains only 1% approx. Basic Aluminium Acetate.

Solution de Burow avec Précipité, P. Belg. IV., Potash Alum 10, Lead Acetate 50, Water 940. The salts are dissolved in half the water and mixed.

Aluminii Acetas. $Al_2(OH)_2(C_2H_3O_2)_4$ (?) = 324·0492.

White powder slightly *soluble* in water.

Is used as a desiccant and deodorant in powder or with glycerin.

Note.—**Neutral Aluminium Acetate** $Al_2(CH_3COO)_6 = 408{\cdot}2804$ is only known in Solution. If such a Solution be evaporated below 38° C. the basic salt probably of formula $Al_2(OH)_2(CH_3COO)_4$, soluble in water, is obtainable as in the Liquor above. If on the other hand the Solution be boiled the basic salt, probably of formula $Al_2(OH)_4(CH_3COO)_2$, is thrown out, *i.e.*, it is insoluble in water.

For ophthalmia neonatorum 10% Ointment has been used applied between the lids every hour in place of Silver Nitrate drops.

ŒDEMATOUS SWELLING: antiphlogistic treatment with cooling applications, boric acid and acetate of aluminium.—B.M.J.E. i./10,36.

As an *anthelmintic* Aluminium Subacetate has been used in treatment of oxyuriasis. Dose for an adult 1 Gm. 3 times daily for three days; for children 0·5 Gm. twice daily—preceded in each case by a dose of Calomel.—W. T. Schmidt, per Jl. Trop. Med., May 1/23,146.

Aluminii Aceto-Tartras.—*Syn.* ALSOL.

Made by dissolving Aluminium Hydroxide freshly precipitated in Acetic and Tartaric Acids. We use 312,360 and 450 parts respectively.

In shining masses, ***Soluble*** in water. An astringent and antiseptic employed in 1 or 2% solution as mouth wash and gargle. Also for wound treatment the same strength.

Solubility.—We find that a solution as strong as 50% in water can be made. Powder finely, and allow to macerate a few hours with shaking. The salt is more rapidly soluble in Ammonium Chloride and in Ammonium Acetate Solutions.

Liquor Aluminii - Aceto - Tartratis, *Syn.* **Aluminium Aceto-Tartaricum Solutum, P. Helv.**

Dissolve Aluminium Sulphate 30 in warm water 100, cool and add Acetic Acid (30%) 36, then, with stirring, Calcium Carbonate 13 in water 35, allow to stand 24 hours with occasional shaking, filter off the solution and add to every 100 of filtrate Tartaric Acid $3\frac{1}{2}$.

Specific Gravity 1·055 to 1·059. Contains about 10% Aluminium Aceto-Tartrate. Acoording to P. Helv. this is to be supplied when Liquor Aluminii Acetatis is ordered. This formula contains Aluminium Sulphate and an excess of Acid.

P.G. VI. contains **45%** Aluminium Aceto-tartrate, and is prepared by dissolving Tartaric Acid 15, in Aluminium Acetate Solution 500, and evaporating on the water bath to 114 and Acetic Acid 6 is added. Filter after standing in stoppered bottle, protected from light. Sp. Gr. 1·26 approx.

Stomatitis may be treated by frequent rinsing of the mouth with this solution and by using Salol as a paste to the parts.

Liquor Aluminii Formatis.—We find this may be prepared by precipitating the Hydroxide from 630 of Aluminium Sulphate crystals, and dissolving in 1152 of 25% Formic Acid. Thus made, it contains the equivalent approximately of $\frac{1}{3}$ of its weight Aluminium Formate taken as $Al_2(H.COO)_6$. Other formulæ have been given for Aluminium Formate. Employed like the foregoing as a gargle, diluted 1 to 3% with water.

Aluminii Chloridum, $Al_2Cl_6,12H_2O=482·8692$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

A white, amorphous deliquescent powder. Has been found of distinct service in locomotor ataxy; relieves the lightning pains.

Liquor Aluminii Chloridi. Dissolve Aluminium Chloride ($+12H_2O$) 20, in water to produce 34 by volume=42·5% by wt. Sp. Gr. 1·35.

Pilula Aluminii Chloridi.—*Martindale.*—2 grains in each.

Dose.—1 to 2 thrice daily. These are convenient for treatment.

Aluminii Chloras, $Al(ClO_3)_3=277·341$.

Deliquescent crystals containing either 6 or 9 H_2O.

A 25% solution may be prescribed. This further diluted 1 to 25 forms a 1% mouth wash or spray in throat affections, and is a prophylactic against infection. A 20% solution in Water or Glycerin has been used on tampons for leucorrhœa or cervical catarrh.

Aluminii Hydroxidum.

Prepared by pouring hot potash alum solution into a hot solution of Sodium Carbonate.

✱**Alocol** (T.M. 406220) **Tablets.** COLLOIDAL ALUMINIUM HYDROXIDE TABLETS. *Dose.*—Two to be dissolved in the mouth half an hour before and after each meal.

For treatment of flatulence, hyperacidity, pyrosis and allied gastric disturbances.

✱**Alumnole** (T.M. 215948) is aluminium naphthol-sulphonate.

Manufacture.—by interaction between Barium Betanaphthol Sulphonate and Aluminium Sulphate Solutions. The Barium compound is made by warming Betanaphthol 10 in Sulphuric Acid 8 on a water bath until a sample dissolves clear in water, then diluting and saturating with Barium Carbonate, filtering and evaporating to dryness (Patent 10,668 expired 1902).

Lotion, gargle and ointment ¼ to 2% in pharyngitis, rhinitis, ozœna, and gonorrhœa.

Pulvis pro Pedibus, P. Helv.

Potash Alum 15, Talc 85, in fine powder. For tender feet. Another useful form of **Foot Powder** is: Talc 2, Boric Acid 2, Orris 1, Zinc Oleate Powder 1.

Kaolin (*B.P.* '14). **Bolus Alba, P.G.V., P. Jap., Bol Blanc, P. Belg. IV.**

Native white aluminium silicate, $H_2Al_2Si_2O_8+H_2O=258{\cdot}6912$, purified by elutriation from sandy matter; it is a smooth white powder and is a useful absorbent for irritation of the skin. It is inacted upon by most chemicals, hence used for making pills of Silver Nitrate, Gold Chloride, and Potassium Permanganate (*see* Unguentum Kaolini). It is useful for sprinkling on to the filter paper in clarifying liquids. It should leave not less than 85% non-volatile residue on ignition, nor should it contain marked impurity of iron.

Absorptive value of Medicinal Kaolin, estimated by a Methylene Blue solution. Kaolin 2 Gm. dried to constant weight and shaken occasionally during ½ hour with 70 Cc. 0·04% aqueous solution of Methylene Blue, should give a colourless filtrate.—J. Rae, P.J. ii./28,150.

Various proportions of NaOH cause different amounts of Kaolin to diffuse in water. 1% causes it to settle in small bulk and renders diffusion difficult. Higher concentrations increase the volume of the deposit and diffusion hence easier.—J. Rae, P.J. ii./30,223.

Internal Use:

Dose.—¼ to 1 ounce (**8 to 30 Gm.**). 'Spoonfuls' are mentioned, with water, milk or emulsified with gum. Best on empty stomach.

Both Talc and Kaolin have been given as substitute for Bismuth in gastric and intestinal affections. Talc is insoluble and not affected by acids. In diarrhœa of phthisis upwards of 200 Gm. *p.d.* Does not constipate like bismuth.

ASIATIC CHOLERA well treated by Kaolin 100 Gm., water to 250 Cc. ½ pint doses were given ½ hourly for the first 12 hours, the second 12 hours several glasses were taken. Vomiting ceased and patients improved. Rectal injections of the same suspension also given. Also good in diphtheria, ptomaine poisoning, bacillary diarrhœa.—R. R. Walker, Proc. R. Soc. Med., Oct. 21; L. ii./21,273,300. Hypertonic Saline in conjunction might be tried in typhoid. —B.M.J. i./21,640.

A suspension of 800 Gm. Kaolin in a litre of water employed, 3 ounces being given every half-hour until vomiting and diarrhœa abate, then continued every hour and then every two hours up to 12 or 15 hours. Renders bacteria and toxins harmless by a process of adsorption.—B.M.J. i./26,440.

More efficacious than injections of antiserum, Iodine, or Hypertonic Saline. Mortality in cholera camps dropped from 44 to 3%. Tumblerful of emulsion containing 100 Gm. Kaolin in 250 Cc. cold boiled water given every half-hour or hour for 6 doses or more and continued for next few days with smaller dosage.—I.M.G., Feb. '26,93.

GASTRIC ULCER.—75 grains of a preparation containing Aluminium Silicate three times a day in milk satisfactory.—L. ii./29,621.

✱**Osmo Kaolin.** (T.M. Osmo 496981, Class 4, Associated and 385762, Class 16, Associated.) *Syn.* COLLOIDAL KAOLIN. *Dose.*—A teaspoonful or more in water, two or three times a day, gradually increased, if required. If necessary, a little aperient is given at the same time. The preparation is a very efficient absorbent of bacteria and toxins. Has also been tried in cases of rheumatism and gout.

For chronic intestinal conditions, and healing ulcerated mucous membrane. A prescription is :—**Collasan** 3½ ounces (a variety in commerce), Tragacanth Mucilage 1 ounce, Peppermint Oil 10 minims, Water 8½ ounces—a wineglassful every 6 hours.—A. C. Jordan, L. i./23,432.

Colloidal Kaolin should contain no organic or inorganic toxic matters and should yield no bacterial growth either aerobically or anaerobically.—A. White-Robertson, P.J. ii./22,396.

Charkaolin Granules.—A combination of Charcoal and Osmo-Kaolin. An absorbent preparation for use in intestinal infections.

Sil-Al.—*Dose*, 1 drachm (**4 Gm.**) increased, in water half an hour before meals, is for the same purposes as the above.

Vaginal insufflation of the powder with subsequent douching to check discharge has been tried. The dry method is claimed to have a prophylactic value—by absorbing irritant discharge the production of fresh erosion is prevented, and those existing have an opportunity of healing.

For protection of skin round gastric or intestinal fistulæ opening through the abdominal wall Kaolin is better than ointments.—M.A., 1931,10.

✱**Kaylene** (T.M. 449072 and 449073).—*Dose.*—A dessertspoonful or more in ½ tumbler of hot water night and morning. For children, 1 teaspoonful. Described as an activated Colloidal Aluminium Silicate absorbing toxins and in early stages of colitis, thus by its mechanical action replacing intestinal Antiseptics, also available as **Laxative, Mint** and **Sweet Kaylene.**

A severe case of food poisoning treated with Kaylene 4 dr. in half tumbler of water hourly. Recovery.

✱**Kaylene-Ol.** (T.M. 486685.) *Dose.*—½ ounce before meals. Contains Hydrocarbon Oil. An evacuant and adsorbent.

Operative Skin Preparation and Treatment.

All clean wounds heal better if kept dry. Moisture favours inflammation. Clean the skin with Ether Soap, then go over with Turpentine, then Biniodide in Spirit, finally cover with Sterile Kaolin and bandage with a dry sterile compress, but no waterproof protective.—L. i./13,1052.

Cimolite is a special preparation, agreeably perfumed.

Fullers' Earth (China Clay) is a similar silicate, containing traces of Iron and Magnesia.

For oil-refining purposes samples from New Zealand as good as Fullers' Earth from Surrey.—Imp. Inst. Rept., 1929.

Terra Alba in commerce is variously Kaolin, Gypsum, Burnt Alum or Magnesia, in preference the first.—W. H. M.

Westcott drew attention to deaths of infants by tetanus when unsterilised Fullers' Earth has been applied to sores on navel and nates. Warning should be given to the poor not to use it. Boric Acid with Zinc Oxide and Starch is safe.

Fulmar Oil.—The oily contents of the stomach of the fulmar petrel, used as dressing to the umbilical cord by the islanders of St. Kilda, might possibly cause tetanus.—B.M.J. ii./26,80,137.

Unguentum Kaolini.

Soft Paraffin 1, Hard Paraffin 1 ; melt, add Kaolin 1, and stir till cold. Spread on rag to apply on abraded skin, it allays irritation. Also as pill excipient, *v. ante.*

Asbestos in intimate contact, *e.g.*, with Solutions, has an action on various substances. Diastase, *e.g.*, is removed from liquids containing this ferment in 24 hours.—the Asbestos itself becoming inactive. Starch Paste (0·5% in water) in presence of Asbestos, after 3 months, shows no trace of Starch in Solution—it is converted into Sugar. The Asbestos also gives no Starch reaction. It reduces the radio-activity of radio-active waters and of Thorium Nitrate Solution. Gelatin loses its power of setting again. It also removes Alkaloids, Proteins and Hormones (*e.g.*, Adrenalin) from Solutions.—B.M.J. i./13,1362,1376. Asbestos is chemically a Magnesium Silicate.

Extraction of Morphine and other alkaloids by means of an insoluble Silicate of Metal of the Aluminium group, *e.g.*, Fullers' Earth. Subject of patent.—P.J. i./14,32.

Pulmonary asbestosis in Asbestos workers.—B.M.J. i./30,789 ; i./31,1112. See also ii./31.80,306,367,1162.

Once Asbestos bodies appear in the sputum the course is progressively downwards and cessation of exposure to dust does not check advance.—Wood and Gloyne, per M.A., '31,56.

Talc. A native foliaceous magnesium silicate ; that from the Tyrol—Venetian Talc—is soft and unctuous.

Talcum Purificatum, U.S., is the above purified (by hydrochloric acid), and it is intended only as a filtering medium.

French Chalk is a harder silicate of magnesium.

Soapstone.—A hard massive variety of French Chalk, consisting chiefly of Magnesium Hydrogen Silicate, $Mg_3H_2Si_4O_{12}$.—C.D. i./30,682.

Steatite.—A hydrated Magnesium Silicate with some Aluminium, Iron, and Lime, used as a furnace lining.—C.D. ii./30,382.

Kieselguhr, a diatomaceous or infusorial earth, known as white peat, burnt produces a light absorbent powder. It is used in making tooth pastes.

Ceyssatite is a calcined siliceous earth from Ceyssa (Auvergne).

Terra Silicea Purificata, U.S. Purified Kieselguhr is prepared by means of dilute hydrochloric acid.

Portland Cement is prepared by incinerating a mixture of Limestone and Clay. Consists mainly of Calcium and Aluminium Silicates. Possesses the property of solidifying to a stone on moistening with water—presumably owing to formation of Hydrous Calcium—Aluminium Silicates and Calcium Aluminates. A large proportion of the lime is, however, present in the cement when 'set' as Calcium Hydroxide. Might be used for its scouring effect on wounds.—L. ii./17,368.

AMMONIUM.

NH_4=18·0392.

Ammonii Bromidum (*B.P.* '14). NH_4Br=97·9552.

Dose.—5 to 30 grains (**0.3 to 2 Gm.**).

Small colourless crystals ***Soluble*** in water 2 in 3, less in alcohol (1 in 15). ***Incompatible*** with mineral acids and silver nitrate. Limit of Lead content as impurity—10 parts per million.

Flavoring.—Glyl Vanillæ, Glyl Rosæ (excellent); Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Possesses similar sedative properties to those of the other bromides, and is thought to cause less depression.

In sea sickness Ammonium Bromide beginning a day or so before the voyage, in doses of 20 grains in Chloroform Water with 15 grains of Sodium Bicarbonate thrice a day found useful.—Yeo.

In tinnitus a course of ammonium bromide with Syrup of Glycerophosphates does well. The Bromide at bedtime.—Sir James Barr.

Tablets, 5 grains (0·3 Gm.) and 10 grains (0·6 Gm.) are made.

Effervescent Ammonium Bromide.

Dose.—1 drachm. Contains 5 grains.

Linctus Ammonii Bromidi. *Syn.* **Elixir Ammonii Bromidi.**

Dose.—1 to 2 drachms (4 to 8 Cc.). Contains 10%.

A palatable method of administering for throat affections.

Mistura Ammonii Bromidi, Phenazoni et Caffeinæ.

Dose.—One ounce (30 Cc.).

Ammonium Bromide 10 grains, Phenazone 10 grains, Caffeine Citrate 5 grains, Chloroform Water to 1 ounce.

Ordinary headache is rapidly relieved by this, repeated in two hours if necessary.—A. P. Luff, B.M.J. i./14,635.

Pastilli Ammonii Bromidi. 1 grain in each with Glyco-gelatin basis. For whooping-cough and throat affections.

Trochisci Ammonii Bromidi with Gum basis, containing 1 grain each, are very useful in asthma and for tickling cough.

Ammonii Carbonas (*B.P.* '14).

$NH_4HCO_3 : NH_4NH_2.CO_2 = 157·1098$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White masses with ammoniacal odour and alkaline taste, consisting of **Ammonium Bicarbonate** and Carbamate. A stimulant, carminative and expectorant.

Soluble 1 in 4 water, 1 in 5 glycerin.

Incompatible with acids, iron salts and salts of alkaline earths. For equivalents to acids *v.* Neutralisation Table.

In broncho-pneumonia ½ to 1 grain doses useful, combined with a little potassium iodide or ammonium chloride, tincture of nux vomica and syrup of tolu. Even grain doses for infants of six months.—Cautley.

In BRONCHITIS 30 grain doses were advised by the late Sir L. Brunton as emetic. Has advantage of being a stimulant:—

'In smaller doses it stimulates the secretion of gastric juice, may be used in atonic dyspepsia, flatulence, etc., as a substitute for alcohol. From its power of stimulating the respiratory centre, it is employed as a stimulating *expectorant* in chronic bronchitis, in the broncho-pneumonia of children, and in asthma depending on cardiac disease.'

For dispensing powdered Ammonium Carbonate is unsuitable, especially if bottle is frequently opened, Ammonium Bicarbonate being formed. A 1 in 8 solution is found to be stable.—P. A. W. Self and C. E. Corfield, P.J. i./26,132.

The solution should be prepared by dissolving the salt in translucent lumps without powdering, in a closed vessel.—R. A. Cripps and F. W. Hoyland, P.J. ii./28,236.

Ammonii Chloridum (*B.P.* '14). NH_4Cl=54·4962.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystals soluble 1 in 3 of water.

Liquid extract of liquorice disguises its nauseous taste.

Incompatible with carbonates of alkalis and alkaline earths.

Flavoring.—Glyl Rosæ, Glyl Coriandri, Syl Lavandulæ, Syl Aurantii Amari ; Extractum Glycyrrhizæ, Syrupus Tolutanus.

NEPHRITIS.—Where ingestion of Calcium Chloride causes nausea and vomiting, Ammonium Chloride in doses of 5 to 16 Gm. for 3 to 18 days may be substituted with practically identical results. Watch for acidosis.—P. S. Hench, Jl. A.M.A. ii./26,13.

SPASMOPHILIA (INFANTILE TETANY).—Ammonium Chloride, 5 Gm. a day, efficacious, but effect only transient. Must be followed up by specific measures against tetany.—Dan T. Davies, L. i./30,202.

For use as an anti-alcohol remedy, *see* Alcohol.

Lotio Evaporans. *Syn.* **Lotio Ammonii Chloridi,** GT. ORM. H.

Ammonium Chloride 15 grains, Alcohol 90% 1 drachm, Water to 1 ounce.

Tablets, 3 and 5 grains ; also 3 grains with Borax 2 grains.

Trochisci Ammonii Chloridi, T.H. 'F.' 2 grains, marked 'M.A.' One every 3 hours useful in congestion of the pharynx and larynx, loss of voice arising from cold and bronchial cough.

Trochisci Ammonii Chloridi cum Glycyrrhiza.

Contain 3 grains of each. **Tablets** are also made same strength.

Trochisci Ammonii Chloridi Compositi, T.H. Contain Ammonium Chloride 1 grain, Potassium Chlorate 2 grains, and ¼ grain approximately of Cubebs. Marked 'C.M.A.'

Vapor Ammonii Chloridi is used in affections of the throat and Eustachian tube.

Inhalers, Ammonium Chloride.—The principle of these consists in combining the vapour of ammonia and hydrochloric acid.

Ammonii Iodidum. NH_4I=144·9712.

Average dose.—5 grains (**0·3 Gm.**).

A white granular salt containing not less than 99% pure ammonium iodide in minute crystalline cubes, very deliquescent and soon becoming yellow or yellowish brown on exposure to air ; odourless when white, with a sharp saline taste and a neutral reaction. ***Soluble*** 1 in less than 1 of Water, 1 in 3 of 90% Alcohol (by experiment). Should be kept from light and air, or free iodine is quickly liberated. It causes less depression than potassium iodide, and is preferred by some for syphilis and rheumatism.

ASTHMA (HUMID).—Ammonium Iodide, Tincture of Sanguinaria, Tincture of Lobelia, of each 1 drachm. Syrup of Tolu to 6 drachms. One drachm in a little water every two to four hours—Bartholow.

Ammonii Nitras. NH_4NO_3=80·0472. *B.P.* 1885.

The fused salt is used for making **Nitrous Oxide.** *Syn.* NITROGEN MONOXIDE U.S., LAUGHING GAS. N_2O=44·046 ; on heating to 350° F. it splits up into this gas and water vapour.

The gas is passed through a strong solution of ferrous sulphate to remove nitric oxide—the traces of acid being removed by passing through alkali. The gas is considered one of the safest anæsthetics. The heart is not directly affected by its action.

There is no anæsthetic, if carefully given, comparable with nitrous oxide for quietly and pleasantly inducing anæsthesia.

Treatment if dangerous symptoms arise during administration of nitrous oxide.

Dangers arising under gas are almost invariably due to failure of the respiration caused either by obstruction or over dose. Obstruction may result from "falling back of the tongue," from pressure due to engorgement of the thyroid or thymus, or other glands in the neck, or from foreign bodies entering the respiratory passages—teeth, bloodclot, vomit, etc. Over-dose is more likely to occur if the patient's clothing be not loose.

If the breathing stop, give no more anæsthetic, clear the mouth and pharynx with a swab or towel round the finger, pull forward the tongue and compress the lower ribs; if no air enter or leave the chest, place the patient upon his side upon the floor, with a pillow or something equivalent under his shoulders. Loosen his clothing, pull the tongue forward and give the tongue forceps to an assistant to keep up the traction. Try to expel any possible obstruction by compressing the lower ribs and abdomen, and then turn the patient upon his back and begin artificial respiration, giving oxygen gas and applying ***amyl nitrite*** or weak ammonia vapour to the nostrils meanwhile. If there be another assistant tell him to give an injection of strychnine ($\frac{1}{30}$ grain) or 1 drachm of ether or both, but do not stop the artificial respiration or waste time over the injection yourself. If no air enter or leave the chest during the artificial respiration, do tracheotomy forthwith, and immediately the trachea is entered resume the artificial respiration and continue it for at least an hour, keeping the patient warm during this time.

It may be preferable, Nitrous Oxide being half as heavy again as air, to place the patient face downwards—in the 'prone' position with a pad below the chest with the forehead upon the right forearm. Then press with the hands over the lower ribs and maintain this for 3 seconds. Then turn the patient on the right side, maintain that position also for 3 seconds—repeating these movements alternately. It may suffice to simply hold patient upside down.

Self administration of Nitrous Oxide, accidental death from.—L. ii./20,1167. Pr. Mar. '22,164.

Nitrous Oxide and Oxygen for major surgery has been extensively used in the U.S. Anæsthesia varies from 11 to 75 minutes.

H. M. Page said the *special indications for the method* are: (1) desperate cases from toxæmia, traumatism or hæmorrhage, if spinal anæsthesia were not used; (2) operations on diabetics; (3) in certain genito-urinary operations. A previous injection of a narcotic with atropine is advised, and failing this atropine alone. Induction recommended to be always done with addition of Ether. H. Bellamy Gardner agreed as to use in diabetics, but not in favour of for abdominal sections.—L. i./13,459.

In *major operations* Teter gives as an average 100 gallons Nitrous Oxide and 20 gallons of Oxygen for one hour's anæsthesia. The temperature of the gases should be 85 to 90° F. His apparatus consists of a stand carrying two cylinders each of Nitrous Oxide and Oxygen and an Ether attachment. The cylinders are in pairs, so that an empty one can be replaced without interfering with the administration.

For operations on regions other than the mouth or nose, injections of Atropine 1/150 to 1/100 grain, Morphine 1/8 to 1/6 grain are given hypodermically 1½ or even 2 hours before the inhalation. Crile and others add Scopolamine 1/200 to 1/100 grain. At first Nitrous Oxide with 2% Oxygen is given with a pressure of 4 to 40 m.m. of Mercury. More or less Oxygen is given according to circumstances—more if patient is cyanosed, less if he struggles. Unconquerable rigidity is controlled by giving Ether—this may occur in about 10% of cases.—D. W. Buxton's "Anæsthetics" 6th Edition.

As anæsthetic in dental work, the average quantity of gas used is 2 to 3 gallons and Oxygen 6—12 ounces. Portable apparatus for the gases. Results in dentistry better than with gas alone.—L. ii./12,1372,1464.

In military *surgery* Nitrous Oxide and oxygen with rebreathing—stated to be infinitely better than Ether or Chloroform.—H. E. G. Boyle, L. ii./17,667.

Nitrous Oxide has been repeated on the same patient every day for more than a month without harmful effects. Ethylene almost as innocuous. Satisfactory anæsthesia cannot be secured with Nitrous Oxide and Oxygen except with adequate preparation; necessary for the patient to be receptive of the gas type of anæsthesia, *i.e.*, with blood stream capable of receiving and using the gas supplied. Anæsthetist must know metabolism of patient.—F. H. McMechan, B.M.J. ii./26,1118.

Surgical anæsthesia with Nitrous Oxide depends partly on the presence of a certain degree of anoxæmia, and this must impose a limitation on its uses and increase its dangers.—W. E. Brown and Co-workers, Jl. Ph. & Exp. Ther., Aug. '27,269.

Obstetrics. Use of Nitrous Oxide and Oxygen. Only a certain proportion of patients are able to be managed with analgesia in labour. It seems to demand great co-operation on part of patient.—J. Blomfield, Pr. Mar. 22,165. See also Pr. Dec. 1920,402.

Anæsthesia with Nitrous Oxide and Oxygen under pressure. An operating room could be built as a pressure chamber. The pressure would be about an extra half atmosphere and the gas 4, 5 or 6 to 1 of oxygen.—H. H. Dale and Leonard Hill, L. ii./21,326.

Gas-Oxygen an effective substitute for Ether or Chloroform. Contra-indications—face and mouth operations: changes in colour render it unsuitable for endoscopic examination of mucosæ and congestive bleeding may make some operations difficult. Apparatus rather expensive.—A. H. Macklin, L. i./30,1231.

Nitrous Oxide and Oxygen better than Ether alone in any case where it is important to prevent or minimise shock.—F. P. de Caux, B.M.J. ii./30,81.

Hydrogen, Ethylene and Propylene (and presumably other gases) mixed with Nitrous Oxide ***form explosive mixtures*** more readily ignitable by heat than similar mixtures with Oxygen.—H. B. Dixon, L. i./27,248.

Ammonii Sulphas $(NH_4)_2SO_4=132{\cdot}1424$.

Colourless crystals soluble 1 in less than 1 of water. Its chief use is as fertiliser and for fire proofing. It is made by distilling gas liquor with lime, into Sulphuric Acid and is a source of Ammonia for refrigeration and similar purposes.

Ammonii Valerianas. **Ammonii Valeras.** $NH_4.C_5H_9O_2=119{\cdot}1114$.

Fr. Cx. Another formula,—$NH_4.C_5H_9O_2+2C_5H_{10}O_2=323{\cdot}2674$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**). In masses of flat colourless deliquescent crystals, with a strong valerian odour, very soluble in water and alcohol. A 25% aqueous solution is prepared for dispensing. *Soluté de Valérianate d' Ammoniaque Composé*, a French 'Nerve Tonic' (Fr. Cx. and P. Helv.), is Valerianic Acid 3, Ammonium Carbonate *q.s.* (about 4) to neutralise, Extract of Valerian 2, Water to 100 all by weight. *Dose.*—2 to 4 drachms (**7 to 15 Cc.**).

Linimentum Ammoniæ (*B.P.* '14).

Solution of Ammonia 1, Almond Oil 1, Olive Oil 2. Shake together.

Arachis or Sesame Oil may be used in parts of the Empire.

To make more fluid, mix the Almond Oil and the Ammonia Solution and the Olive Oil afterwards.

'Hartshorn and Oil' is usually Solution of Ammonia 1 and Almond Oil 3, shaken together.

Liquor Ammoniæ. *In Great Britain, Northern Ireland and Irish Free State to be labelled "Poisonous—Not to be taken," and to be supplied in bottle distinguishable by touch.* For further conditions of Sale *v.* p. 38.

Solution of Ammonia (*B.P.* '14) has Sp. Gr. 0·959. This and **Aqua Ammoniæ**, U.S., and **Ammonia Liquida**, Ph. Ned. V., contain 10% by weight of NH_3.

Fr. Cx.—**Ammoniaque Diluée** is about the same strength.

Dose.—10 to 20 minims (0·6 to 1·2 Cc.).

Hypodermically 2 to 6 minims for collapse; or up to 36 minims for snake poisoning.

Internally it is stimulant, diuretic and diaphoretic.

In embolism large doses of ammonia, well diluted, tend to reduce the coagulability of the blood.—Whitla.

Liquor Ammoniæ Fortis. "*Poisonous—Not to be taken,*" *cf. antea.*

Dose.—3 to 6 minims (0·2 to 0·4 Cc.).

Contains 32·5% by weight NH_3. Sp. Gr. 0·888. (Aqua Ammoniæ Fortior, U.S. X. contains 27 to 29%. **Ammoniaque officinale.** Fr. Cx. 20·18%). *Ammoniaca Liquida*: P. Ital. V. and F. E. VIII. is 20% (Sp. Gr. 0·925.)

Haber, of Karlsruhe, succeeded in combining atmospheric Nitrogen with Hydrogen, producing Synthetic Ammonia.—Na. Feb., 1911,560. Germicidal action, see *Vol. II.*

Ammonia Sterules, 3 minims in each of strong Ammonia Solution.

Encased in cotton wool and Rayon. Intended as a restorative—to be crushed and contents inhaled—a portable form of smelling bottle.

Ocular injury caused by inhalation of 10% Ammonia.—I. Abramovicz, Brit. Jl. Ophth., May, '25,241; per Pres., Feb., '26,63.

Enema Ammoniæ.—Strong Ammonia Solution 1, Water 160 (1 drachm to the pint).

In the treatment of post-operative ileus and intestinal paresis—a sequel of abdominal operations most distressing to the patient. Its effect is enhanced by a dose of Pituitary Extract hypodermically given ½ hour previously. Effects a good motion and discharge of excessive flatus. Not to be used too frequently or in excess of above strength.—T. A. Black, L. ii./16,374.

Liquor Ammoniæ Domesticus (*vel* **Detergens**), **Household Ammonia.** *Signa*—"*Poisonous—Not to be taken.*"

Oleic Acid 1, Alcohol 1, mix and add strong Solution of Ammonia 7, Distilled Water 7; shake well. For use diluted as a detergent of the skin. In the bath 1 in 1,000 to 2,000 softens the water; also for general domestic purposes.

Cloudy Ammonia is made with tap water—for this the gravity of the preparation must not be too light, otherwise the lime salts constituting the 'Cloud' will settle down. We can recommend the following:—Dissolve Castile Soap 1·3 in Water 60, and add Strong Solution of Ammonia 27, Lime Water 0·6, and Water to 100.

Hair Lotion, Erasmus Wilson's.

Strong Solution of Ammonia 1, Almond Oil 1, Spirit of Rosemary (*B.P.* 1885) 4, Honey Water 2.

For alopecia areata Strong Ammonia Solution 1, Chloroform 1, Olive Oil 1, Spirit of Rosemary to 8, is useful.

Liquor Ammonii Acetatis (*B.P.* '14).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Keep in green glass stoppered bottles.

The neutral point may be found by trying effect on a little ammonium carbonate on a watch glass.

U.S X. is similar and contains 6·5 to 7·5% Ammonium Acetate.

℗**Mistura Anti-Catarrhalis.** *Burney Yeo.*

Solution of Ammonium Acetate 3 drachms, Spirit of Nitrous Ether 1 drachm, Opium Tincture 10 minims, Ipecacuanha Wine 5 minims, Camphor Water to 1½ ounces. To be taken at night. Assists action of skin and kidneys.

Liquor Ammonii Acetatis Fortior. *B.P.* 1885.

Dose.—25 to 75 minims (**1·5 to 5 Cc.**). Ammonium Carbonate 1, Acetic Acid *q.s.*, Water to 4, *i.e.*, approx. 5 times as strong as the *B.P.* '14 Liquor.

P. Off.—The concentrated liquor to be a 1 to 7 preparation and to contain 57·5% *w/v* Ammonium Acetate.

Acetate d'Ammonium Dissous (Solution Officinale). Fr. Cx.

Contains 18·5% by weight of Ammonium Acetate.

Ammonii Acetas.—$CH_3.COONH_4$=77·0626.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

This salt is obtainable in white crystals, very soluble in water.

Incompatible with mineral acids, alkaline carbonates, potassium chlorate and dichromate, and with mercurous nitrate.

Serviceable in all fevers and in dilirium tremens, one drachm every hour at first, reduced gradually.

Choice of a diuretic.—Ammonium, Sodium and Potassium Acetates, Citrates and Tartrates, increase osmosis and are diuretics by stimulating the convoluted tubes of the kidney. They draw water from the tissues into the blood stream; they do not irritate the kidneys and may be used even when the organs are acutely inflamed,—they should be well diluted. Useful to combine Spirit of Nitrous Ether with them, which, owing to the Ethyl Nitrite contained in it, is a useful agent in causing dilatation of the different vessels of the kidney. The action of these drugs, *e.g.*, in renal dropsy, should be encouraged by sufficient doses of a watery aperient every day or other day, *e.g.*, Compound Jalap Powder.—B.M.J. i./11,289.

Mistura Febrifuga, N. H. W. (not in E. G. A.). Solution of Ammonium Acetate 2 drachms, Spirit of Nitre 20 minims, Sodium Bicarbonate 5 grains, Chloroform Water to ½ ounce.

Liquor Ammonii Citratis (*B.P.* '14).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Prepared by neutralising Citric Acid 10, with Ammonium Carbonate 7 or *q.s.* in Distilled Water *q.s.* to 80. Keep in green bottles.

Liquor Ammonii Citratis Fortior. *B.P.* 1885.

Dose.—30 to 90 minims (**2 to 6 Cc.**).

Was four times as strong as the above.

Ammonii Citras.—$C_3H_4.OH(COONH_4)_3$=243·1566.

This salt is a deliquescent white powder, diuretic, and acts similarly to the acetate. *Dose.*—30 to 60 grains (**2 to 4 Gm.**).

In Pneumonia a mixture of the following: Solution of Ammonium Citrate 30 minims with Potassium Iodide 4 grains and Potassium Citrate 10 grains, in a tablespoonful of water every four hours—an 8 ounce bottle made up as above, proved an efficient treatment for the seventh time in a bad case.

Ammonii Tartras $(CHOH)_2(COO)_2(NH_4)_2 = 184{\cdot}1096$.
White crystals soluble in water.

Liquor Ammonii Tartratis R.O.H.—20 or 40 grains to Distilled Water 1 ounce.
Irrigation (under Cocaine initially) with 5 to 10, and ultimately 20% solution, in a case of erosion of the cornea—complete clarification.—M. /08,128.
Lime burns of the eye. Daily irrigation for a period of 15 minutes with a 10% solution of Neutral Ammonium Tartrate recommended. Stated to dissolve the Calcium Carbonate formed in the tissue.—L. i./26,1212.

Spiritus Ammoniæ Fetidus (*B.P.* '14).
Macerate Asafetida 75 in small pieces in a closed vessel in Alcohol 90%, 750 for 24 hours. Distil until Alcohol ceases to be condensed. Mix distillate with Strong Ammonia 100 and add Alcohol 90% *q.s.* to 1,000.

Flavoring.—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri all double dose) ; Syrupus Zingiberis (not so good).

Spiritus Ammoniæ Aromaticus (*B.P.* '14).
Dose.—20 to 40 minims, for repeated administration ; single, 60 to 90 minims.
Contains approximately 2·4% by weight of NH_3. That of U.S. contains Ammonium Carbonate 3·4, Ammonia Water 9, Lemon Oil 1, Lavender Oil 0·1, Nutmeg Oil 0·1, Alcohol 70, Water to 100 and is not distilled.

Liquor Ammoniæ Aromaticus (Simplex)
Ammonium Carbonate 4 ounces, Strong Solution of Ammonia 8 ounces, Terpeneless Oil of Lemon 13 minims, Terpeneless Oil of Nutmeg 54 minims, Alcohol (90%) 6 ounces, Distilled Water 149 ounces. The Oils to be dissolved in the Spirit before adding to the rest of the mixture. The liquor has been suggested as being useful in ' Stock Mixtures '—*i.e.*, for Hospital work, etc., where the saving of Spirit is a consideration.
This preparation mixes perfectly clear with water as distinct from the *B.P.* '14 Spirit. It is not so pungent to the taste as Sal Volatile.

Liquor pro Spiritu Ammoniæ Aromatico.
For dilution 1 with 3 of a mixture of Alcohol (90%) 12 and Water 1.
Dissolve Ammonium Carbonate 4 ounces in Water 20 ounces. Add Strong Solution of Ammonia 8 ounces then Terpeneless Nutmeg Oil 54 minims and Terpeneless Lemon Oil 13 minims in Alcohol (90%) 10 ounces.
May also be prepared for dilution 1 *with* 2 with the same Alcohol mixture as for the ' 1 with 3 ' preparation above. In this case proceed as for the latter, but dissolve the Ammonium Carbonate in Water $21\frac{1}{2}$ ounces and the Oils in Alcohol 90% $21\frac{1}{2}$ ounces. This is clearer than the above.
Note.—It is not practicable to make a Concentrated Liquor for dilution with *Water only.* Our experiments show it is not possible to make the Concentrated Liquor much stronger in Alcohol than is contained in the above, as the Ammonium Salts are thrown out.

AMYGDALA AMARA. (*Rosaceæ.*)

Bitter Almond. (*B.P.* '14).

Oleum Amygdalæ (*B.P.* '14) is expressed from the seeds of this ıd the sweet almond. The content of oil in bitter almonds is ·5%, to 62·5%, average 51·3%; in sweet almonds 45·3-67·1%, erage 58·9%.—P.J. i./23,324. The residue from bitter almonds is ilised for the production of Essential Oil of Bitter Almonds (**Benldehyde**, C_3H_5COH=106·0468, or Oleum Amygdalæ Essentiale *ne* Acido Hydrocyanico). **Benzaldehyde** is official in P.G. VI., .S., F.E. VIII. and P. Jap. IV. *Dose.*—½ minim (**0·03 Cc.**). In tter case produced artificially or as above, containing not less than 5%, Sp. Gr. 1·045 at 25° C. B. pt., 179° to 180° C. Tests for hydroanic acid and chlorinated products and assay process are given in .S. Is a flavouring agent and non-poisonous.

Ⓓ **Oleum Amygdalæ Amaræ Essentiale.**

Ⓟ *Almonds, Essential Oil of (unless deprived of Prussic Acid), also eparations or admixtures containing.*

The Essential Oil containing the Hydrocyanic Acid to the extent about 5% is also prepared and must be carefully distinguished om the foregoing. (That ordered by U.S. contains not less than 2 more than 4%.)

The glucoside **Amygdalin** $C_{20}H_{27}NO_{11},3H_2O$=511·2654 (P. Svec. X)—crystals soluble in 12 parts of water with slightly bitter taste -in the presence of the enzyme **Emulsin**, a constituent in the seeds, kes up water on coming in contact with it, forming grape sugar ıd [℗1] Benzaldehyde-hydrocyanic Acid, $C_6H_5COH+HCN$= 3·0624. *Syn.* Benzaldehyde Cyanhydrin $C_6H_5CH(OH).CN$, P.G. I. This latter compound is decomposed and the Hydrocyanic cid is removed to produce the above Essential Oil suitable for avouring purposes. A similar body to Amygdalin, or one identical ith it, is contained in *Prunus Laurocerasus* (Cherry Laurel eaves.)

[1] **Aqua Laurocerasi** is standardised (*B.P.* '14), Fr. Cx., P.G.V. ıd F.I.) to 0·1% Hydrocyanic Acid. It also contains some Benaldehyde.

For analytical data, vide Vol. II.

It is liable to variation and is unsuited to make eye lotions.—C. M. Caines, .J. ii./22,91.

[1] **Aqua Pruni Macrophyllæ** (from fresh *Bakuchi* Leaves). P. ap. IV. contains also 0·1% Hydrogen Cyanide.

[1] **Aqua Amygdalæ Amaræ** should contain the same amount of ydrocyanic Acid.—F.I. and P. Jap. III. (now omitted). (U.S. IX. as 1 of oil of bitter almonds shaken in 1,000 of water and filtered.)

verage dose.—1 drachm.

F. Norsk gives a "synthetic" Bitter Almond Water, viz:—
Oil of Bitter Almond 4, Hydrocyanic Acid (2%) 50, Alcohol (90%) 146, istilled Water 800. Contains 0·1% HCN.

Amygdalin is also contained in the bark of *Prunus serotina* (Virinian Prune or Wild Cherry bark), and the same action occurs when his drug is bruised with water.

Solubility.—Almond oil dissolves in all proportions in chloroform, about 1 in $2\frac{1}{2}$ of ether and slightly in alcohol 90%.

Spiritus Amygdalæ Amaræ, U.S. IX. *Average dose.*—8 minims. Oil of Bitter Almond 1, Alcohol 80, Distilled Water to 100.

Amygdala Dulcis also yields about the same amount of Oleum Amygdalæ as Bitter Almond (*v. antea*) and contains Emulsin, but is free from Amygdalin.

Pulvis Amygdalæ Compositus (*B.P.* '14).—Sweet Almonds powdered (*s.a.*) 6, Refined Sugar 3, Powdered Gum Acacia 1.

Mistura Amygdalæ (*B.P.* '14) contains of this Powder 1, Water to 8, rubbed smooth and strained.

Emulsum Amygdalæ, U.S. IX. (not now in U.S.).—*Average dose* 4 ounces. Sweet Almonds 60, Acacia Powder 10, Sugar 30, Water *q.s.* to 1,000.

Sterilised Almond or **Olive Oil** or **Liquid Paraffin** intended for hypodermic injection, or lubricating catheters, is prepared by sterilising the oil in small flasks or bottles tightly plugged with cotton wool at 115° C. for 10 minutes.

Physicians and Surgeons should specify which oil is to be employed for 'Sterilised Oil.'

Oleum Amygdalæ Persicæ. *Syn.* Peach or Apricot Kernel Oil (or Mixtures). Is available in commerce and used instead of Almond Oil in culinary arts and for face creams, etc.

Bieber's modified Nitric Acid Test indicates presence of small quantities of Peach Oil in Almond Oil. *cf. B.P.* '14.

There is no pharmacological difference between this oil and the expressed oil of almonds. Kernel oil has the higher Iodine No., *vide Vol. II.*

AMYL NITRIS.

B.P. '14, **U.S. X., Ph. Ned. V., P. Austr., P. Belg. IV., P. Jap., P. Hung., P. Ital. V., P.G. VI., P.Svec. X., F.E. VIII.** *Syn.* Amylium Nitrosum. $C_3H_{11}NO_2$=117·1038.

Dose.—By inhalation, the vapour of 2 to 5 minims (**0·12 to 0·3 Cc.**) up to 10 minims—*Martindale.* By the mouth $\frac{1}{2}$ to 1 minim (**0·03 to 0·06 Cc.**). Hypodermically, 1 to 5 minims (**0·06 to 0·3 Cc.**).

A yellowish ethereal liquid with a peculiar not disagreeable odour; produced by the action of nitrous acid on amylic alcohol boiling between 128 and 132° C. and consisting chiefly of iso-amyl nitrite. —Sp. Gr. 0·870 to 0·880; not less than 90% distils below 212° F Amyl Nitrite is ***soluble*** in alcohol but insoluble in water. Should be kept cool; by exposure to the air it becomes comparatively inert.

For Assay see Vol. II.

Incompatible.—Alkaline Carbonates, Potassium Iodide, Bromides and Ferrous Salts.

Pharmacology.—Amyl nitrite dilates the vessels and lowers blood-pressure. In 30 to 40 seconds after inhaling or swallowing a dose it flushes the face, and increases the heat and perspiration of the head and neck.

The effect on the pulse can be shown within ten seconds of inhalation. This is due to the large area of the lungs absorbing the drug—

roughly 100 sq. meters—and to the thinness of the membranes (about $\frac{1}{1000}$ m.m.) separating the air of the pulmonary vesicles from the blood.

The action of Amyl Nitrite and the Nitrites generally in relaxing arterial tension, was discovered experimentally by Rutherford and Gamgee. This led Sir Lauder Brunton to the discovery of its value and that of Nitroglycerin for relief of anginal spasm.

He first used Amyl Nitrite in angina pectoris in the winter of 1866–67. During an attack in this case the pulse became very quick and the pulse tension considerably raised. This rise of pressure he attributed to contraction of the arterioles. The success of the remedy proved the truth of the theory which led him to administer it.—L. ii./15,163. With the inhalation of Amyl Nitrite the vessels dilated and the pain passed off. It is now used for all varieties of cardiac pain, especially when it comes on in paroxysms.—H. W.

Amyl nitrite *cannot be deemed dangerous* in use in any way. Murrell writes—'A patient took a teaspoonful, vomited in a few minutes and seemed none the worse—another took 4 drachms and recovered—I know of no fatal case.'

Lowering of venous tension in each of 5 persons, preceded in one case by brief hypertension. Action of Trinitrin analogous in 7 cases, preceded by hypertension in three.—Comptes Rend., July 10, '25, per Jl. A.M.A. ii./25,1259.

Uses.—It has been successful in relieving angina pectoris, sea-sickness, ague, spasmodic asthma, migraine, neuralgic dysmenorrhœa, post-partum hæmorrhage, tetanus, as an antidote to chloroform, to ward off epileptic attacks, and for the spasm of false croup and whooping-cough, and in cocaine and strychnine poisoning. It is largely employed in threatened fainting and collapse, and as a restorative after gas in dental extractions. It is valuable to restore animation in cases of apparent death, as from drowning.

Amyl Nitrite Sterules, *Martindale.*

Encased in cotton wool and Rayon ; 1, 2, 3, 4, 5, 6, or 10 minims (0·06, 0·12, 0·2, 0·25, 0·3, 0·4 and 0·6 Cc.).

In use the sterule is broken, the liquid soaks the cotton wool and cover, and can be inhaled most conveniently. The 3-minim size meets most wants.

The contents of these sterules do not deteriorate on keeping. On the contrary, the contents of some 17 *years old were found to be fully active.*

Fr. Cx. has **Azotite d'Amyle.**—

'Preferably preserved in Sealed Capsules.'

U.S., F.E. VIII., and P. Jap. direct to be kept in the same manner

In Angina Pectoris the best form for administration of Amyl Nitrite. Several may be used as there is practically no danger from its administration.—Whitla. In some cases more than average doses are needed to bring about fall of blood pressure.

Pseudo-angina occurring, as a rule, in the young, not serious with regard to patient's life, and is not relieved by the Nitrites—it requires tonic treatment and exercise ; true angina requires the Nitrites and Iodides. Brunton observed that rise in tension occurred along with angina and probably caused it.—B.M.J. ii./09, 1128.

Causation of Angina Pectoris.—The exciting causes to angina

pectoris are increased muscular effort and conditions which produce increased pressure in the peripheral arterial circulation—that is, conditions which throw an increased strain (either actual or relative) on the left ventricle.—Byrom Bramwell.

Clifford Allbutt lays down the rule that everyone of forty and over should at intervals of five years or so have his blood pressure measured in order that he may know in time if he be tending towards arteriosclerosis. A man of, say 45, in whom a systolic pressure of some 160 m.m. of Mercury is found may seem well but has probably a slight increase in amount of urine, which will be too watery and may show a trace of albumin occasionally and probably now and then a few hyaline casts. Cut down animal proteids, give lacto-vegetarian diet, cut off excessive smoking and Alcohol, give a saline purge every morning with an occasional mercurial purge and the pressure will come down to normal or nearly so. If this is not sufficient Potassium Iodide will help. It probably helps in elimination. Not by any means a general rule, but occasionally high blood pressure may need use of vasodilators.

Vasodilators usually act even in profound cases of arteriosclerosis, and Wallace and Ringer showed that their action is more prolonged here than in normal vessels. They may be placed in the following order as to speed of action and associated evanescence of effect :—

Amyl Nitrite, Nitroglycerin, Spirit of Nitrous Ether, Sodium Nitrite, Erythrol Nitrate, and lastly and more lasting, Mannitol Nitrate.

In tobacco angina, useful.—Osler.

In chloroform syncope, Amyl Nitrite affords the quickest means of restoring the heart's action. The sterules are the most convenient form of using it.

Longevity.—An early recognition of excessive tension is one of the important steps towards this (Hill and Barnard's and Oliver's Sphygmomanometers indicate the oscillations readily and are recommended). The systolic pressure is taken to be that which suffices to stop the pulse altogether, and the diastolic that at which the index gives the maximum oscillation. The normal systolic pressure is 100–120 m.m. for young adults, 115–135 or 140 for men in middle life and above 150 is abnormal. To lower pressure potassium iodide and cholagogues, etc., are used, but Amyl Nitrite and isobutyl nitrite have more rapid action than any other drug and are useful in cutting short paroxysms of pain. Nitroglycerin can be given in divided doses during the day and keeps the tension low. Erythrol Nitrate has a still slower and more prolonged action.—Sir Lauder Brunton, L. ii./06,1335.

The nitrites have been used in many cases of aortic disease for a great length of time with marked relief of urgent symptoms and with no indication of prejudicial effects.

Angina is a symptom relieved by certain drugs which dilate the coronary arteries and improve blood supply to the heart : on this supposed effect of Amyl Nitrite, etc., is based the more widely accepted view of the pathology of the condition that it is caused by disease of the coronary vessels. The condition is however a symptom-complex and that ill-defined!—Harlow Brooks, B.M.J. i./31,18.

Observations upon angina pectoris. Nature and distribution of the pain, duration of attack, etiology—the current theory (Allan Burns) is that it results from muscular anoxæmia—diagnosis, prognosis, treatment. If the blood pressure is raised during attacks the Nitrites are useful, but useless if it is not raised. Sedatives—Morphine.—John Cowan, B.M.J. i./31,879.

SENSE OF DYING.—Amyl Nitrite effective in a case when consciousness lost and pulse-rate fell to 19 to the minute. Pulse rose to 52 and some colour returned. There was no evidence of heart disease.—J. A. Ryle, L. i./31,740.

In an attack of angina pectoris its efficacy is well known.—R. O. Moon, Pr., April, '28,225. *See also* M. Newman, Pr., Sept. '30, p. 400.

No reason why Amyl Nitrite and Nitroglycerin should not be used indefinitely. They enable patient to lead a more normal life.—Maurice Campbell, Pr., Jan., '31,35.

AORTIC INCOMPETENCE of syphilitic origin. A man while lying quietly in bed, suddenly developed acute pain, described as 'knife-like and stabbing,' in right shoulder, spreading over the precordium and down left side. "During the attack he had an expression of intense agony on his face. The whole affair was relieved in about 2 minutes by Amyl Nitrite." About 20 minutes later the pain returned, but Amyl Nitrite again afforded relief with no return of pain. 12 days later there was another attack, accompanied with dyspnœa and a pulse-rate of 124, Amyl Nitrite again gave almost instant relief.—C. F. Coombs, B.M.J. i./28,1012.

HÆMOPTYSIS arrested in every case in which Amyl Nitrite was tried, whether of mitral obstruction or from phthisis. Normally the effusion of blood irritates the lung tissue, causing coughing. The strain raises the blood pressure, inducing fresh bleeding. A vicious circle is in this way maintained till eventually the loss of blood becomes so great that the exertion of coughing no longer causes a marked rise of pressure, then the bleeding ceases. Amyl Nitrite accomplishes the same effect without further loss of blood.—Edin. Med. J. July, 1904 ; L. ii./04,522,942,1446 ; M.A. 1906,240 ; B.M.J.E. i./06,79. In severe hæmoptysis—rupture of an atheromatous pulmonary vessel—free use satisfactory.—B.M.J. i./06,917.

The general vasodilation produced is preferable to the vaso-constriction effected by Adrenalin internally.—L. ii./04,1446.

Amyl Nitrite has the support of many clinicians.—F. G. Chandler, L. i./30,589. See also further abstract of this paper in Therapeutic Index under Hæmoptysis.

Hæmorrhage from bullet wounds in the chest, *e.g.*, in battle, can be controlled by inhalation of 5 minims.—L. ii./07,941.

One of the most useful drugs in dealing with the immediate emergency of hæmorrhage.—H. H. Carleton, Bristol Med. Clin. Jl., Spring, '28,39 ; per Pr., Aug. '28,133.

In hæmoptysis amyl nitrite acts better the quicker it is used. In most cases it can be completely arrested if inhaled as soon as the first signs of blood show themselves in the sputum. If excitement afterwards of any kind, $\frac{1}{4}$ grain Morphine given. Amyl Nitrite, the drug *par excellence*, to be used first. Especially useful in sanatorium work where the patient is seen at the beginning of attack.

In pulmonary hæmorrhage resort at once to Amyl Nitrite after $\frac{1}{4}$ grain Morphine Tartrate hypodermically. The cough slackens and hæmoptysis decreases.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

In cerebral hæmorrhage Amyl Nitrite would appear to have advantage over venesection. It was found that in animals the drug stimulated the respiratory centre in addition to decreasing the blood pressure. It may be

possible with this drug in man to cause a temporary fall of blood pressure without prejudicially affecting the respiratory centre as may occur with venesection.—Philip Hamill, Clin. Jl., July, '14,430.

POST-PARTUM HÆMORRHAGE arrested.—B.M.J. ii./06,1125.

Invaluable, but must be used with caution. During parturition Chloroform, as is well known, is safe owing to the tension within the abdominal cavity, but it is dangerous given shortly after delivery, on account of the sudden withdrawal of this tension, which is liable to cause paralysis of the vasomotor mechanism, thus permitting the blood to accumulate in the splanchnic area. L. Hill has pointed out that Amyl Nitrite, if incautiously given, may produce the same effect.—A. T. Brand and J. R. Keith, "Clinical Memoranda for General Practitioners," 1923.

Can be used to control flooding at periods. By dilating the arterioles generally it diminishes the peripheral resistance; thus reduces general blood pressure, and thereby the vascular distension of the uterine mucosa. May prove of value in tiding over fibroid disease until the menopause, without necessity for major operation. Obviously patients should be prevented from using to arrest normal flow.

In cases of 'contraction ring' Amyl Nitrite inhalation is the one method of treatment which alone seems to meet with universal success. Description of 5 cases, inhalation followed by delivery.—C. R. Croft, L. ii./28,167.

IN TETANUS, inhale at every spasm to gain time.—L. i./09,103.

INFANTILE CONVULSIONS are well treated by inhalation of 1 minim doses; a whiff sometimes cuts the attack short.—Whitla.

A powerful agent to relax UTERINE SPASMS and HOUR-GLASS CONTRACTION, whether natural or caused by ergot.

EPILEPSY well treated, controlling the fits and preventing insensibility.—B.M.J. ii./89,599,688.

ASTHMA is relieved by Amyl Nitrite relaxing the peripheral vasoconstriction which is an essential factor in the bronchial vascular distension responsible for the obstruction in respiration.—L. i./07, 189. Pr., Oct. 1910, p. 529. Clin. Jl., Aug. 1909. After the relief the patient usually no longer suffers from cold hands and feet. Brilliant results follow the removal of polypi from the nose—this has a marked effect on blood pressure.—B.M.J. ii./11,1327.

In CROUP prompt in action.—Whitla, Pract. Med.

In HICCOUGH sometimes gives good results.—*ibid.*

In CARDIAC DISPLACEMENT. A case of severe attacks of dyspnœa which occurred every two days, a history of pleurisy. As a result of the adhesions, the heart was anchored much outside the usual position. Amyl Nitrite advised, which patient used (5 minims) during next attack, this so allowed the heart to act 'as it were being pulled right out' that it broke away from its false moorings. Patient able to bend with ease which was previously impossible. No further angina attacks which previously occurred every two days or so. Further treatment Strophanthus Tincture, which brought the heart back to normal position.—J. C. McNaughton, B.M.J. ii./12,181.

INTRATHORACIC ANEURYSM. For the acute anginal attacks—Amyl Nitrite inhalation followed by internal use of Nitroglycerin or Erythrol Nitrate $\frac{1}{4}$ to $\frac{1}{2}$ grain is generally efficacious.—F De Havilland Hall, L. ii./13,948.

Fear of death entirely disappeared as patient knew he would get relief from Amyl Nitrite or Nitroglycerin. Angina much more common amongst the rich than the poor, associated as a rule with gout.—L. ii./09,572.

Hysterical APHONIA. Vasodilators (Amyl Nitrite and Nitroglycerin) used with success. A woman lost her voice for several days. After a few doses of Nitroglycerin 1/100 grain, aphonia disappeared and did not return. A girl of 18 had been aphonic for a year with varied treatment unsuccessfully. On inhaling a little Amyl Nitrite her voice instantly returned. Also used *per os* with Sodium Nitrite.—J. R. Keith, B.M.J. i./15,847.

PURULENT PERICARDITIS simulating angina pectoris. Patient when first seen was in an almost moribund condition. Pulse could not be felt; heart apparently beating feebly and irregularly at about 50. Strychnine and Camphor were injected with little improvement, but there was prompt response to *Amyl Nitrite*. At autopsy the pericardium was found to contain about 2 ounces of hæmorrhagic sero-purulent fluid. The man was probably killed by angina pectoris, but this condition was excited by the unrecognised pericarditis.—M. A. Cassidy, R. O. Moon and F. Le Q. Pelly, L. ii./21,559.

ACUTE SUFFOCATIVE PULMONARY ŒDEMA. Patient, well-built, felt perfectly fit all day, but awoke suddenly at night with intense dyspnœa and feeling of impending death. Became cyanosed, orthopnœic and speechless. 1/100 grain Digitalin subcutaneously with improvement in pulse, but he complained of pressure in the head and giddiness. Amyl Nitrite inhaled with wonderful effect. Venesection employed, with instant relief. Blood pressure reduced.—F. Stuart Coleman, B.M.J. i./26,696.

Of value for relief of pleuritic pain.—H. Cardin, B.M.J. ii./29,482.

SKIN AFFECTIONS: Eczema and other skin affections improved remarkably by inhalation. the arterial hyperæmia being the curative factor. Local treatment is also promising and brilliant results are stated to be obtained in urticaria and in senile pruritus.—Jl.A.M.A. i./25,1241, per P.J. i./25,546.

As a DIAGNOSTIC TEST OF MITRAL STENOSIS. Its action like that of exercise is to increase the flow of blood through the A—V ring which favours the production of the murmurs in question. Inhalation of 3 minims will often bring to light a clear presystolic or full diastolic murmur in a patient lying on his back, rendering early mitral stenosis diagnosable.—R. A. Morison, B.M.J. i./18,452. See also T. Fisher, *ibid.* 577.

Sterules, Hypodermic, contain 15 minims (1 Cc.). (Note the hypodermic *dose* is 1 to 5 minims.) Useful when inhalation is impracticable.

Amyl Nitrite in conjunction with **Pilocarpine Hair Lotion** (*q.v.*) has been used to increase the growth of the hair. Employ Amyl Nitrite 10% in Alcohol 90%. To be rubbed in the scalp on alternate nights.

ANTIMONIUM.

Sb=121·76.

Antimony Alloys, Antimony Poisoning and Fur Dermatitis, see Vol. II.

Antidotes to Antimony Compounds.—Stomach tube (for Tartar Emetic, but not for Butter of Antimony), emetics, tannin or tea followed by stimulants.

Accidental poisoning. A case is recorded with recovery. Child was fed with milk and white of egg for the first 24 hours, afterwards barley water. A mixture containing Cinchona and Calumba was given subsequently.

Stibnite (Antimony ore) shipped from Alaska.—P.J. i./16,623.

℞ **Antimonii Arsenas.**

Dose.—$\frac{1}{100}$ to $\frac{1}{30}$ grain (**0·0006 to 0·002 Gm.**) twice or thrice daily. *Max. single dose.*—$\frac{1}{30}$ grain (**0·002 Gm.**); $\frac{1}{3}$ grain (**0·02 Gm.**) in 24 hours.—M.A.

A mixture of Antimonic Oxide and 20% Arsenic Acid; a heavy white powder. Used in syphilis and skin eruptions. Nervine and muscular tonic. Is a constituent in GÉLINEAU'S DRAGÉES.

Dose of these is one twice a day, increased to three, after meals.

For further details of their composition see Vol. II.

Antimonium Sulphuratum (*B.P.* '14). A mixture of the sulphides and oxides in orange red powder.

Uses.—Diaphoretic. In syphilis and skin affections.

Kermes Minerale is made by boiling black Antimony Sulphide (Tri-sulphide) with Sodium Carbonate Solution, and allowing the liquor to cool. **Tabellæ**, P. BELG., contain 0·01 Gm.

Dose.—1 to 2 grains. ***Incompatible*** with sodium bicarbonate and potassium acid tartrate.

Antimonii Pentasulphidum. Pentasulfure d'Antimoine. FR. CX., Ph. Ned. V., P. Belg. IV., P. Ital. V. Sb_2S_5=403·82.

An orange powder made by decomposing !Schlippe's Salt (Sodium Sulph-Antimonate $Na_3SbS_4.9H_2O$) with dilute Sulphuric Acid.

Antimonium Nigrum Purificatum. *B.P.* '98, P. Belg. IV. Sb_2S_3=339·7. Greyish crystalline powder, decomposed by boiling hydrochloric acid. Used in veterinary practice as parasiticide.

Stibium Sulfuratum (Trisolfuro) Crudum. *Syn.* **Stibina** or **Antimonio Crudo**, P. Ital. V. is converted into **Stibium Sulfuratum depuratum.** *Syn.* **Stibina depurata** by treatment with Ammonia. F. E. VIII. is similar.

Linctus Expectorans.

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Sulfidi Stibici (Antimonii Sulphurati) 2, Syrupi 450, Aquæ Amygdalæ Amaræ 50. To be shaken before administering. Said to be of value for cough. Ph. Notes.—Denmark.

Antimony Crocus.—For veterinary use, is a mixture of Tri-oxide (about ⅘) and Tri-sulphide (⅕). Formed by heating equal weights of Antimony Tri-sulphide and Potassium Nitrate to which $_1^1{}_2$ of Hydrochloric Acid has been added.—U.S.D.

Antimonii Oxidum (Antimonious Oxide) Sb_2O_3=291·52.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

A white powder, soluble in Hydrochloric Acid and in Alkaline Tartrate Solution, Caustic Potash, etc. Expectorant and emetic.

Injectio Antimonii Oxidi.—*Martindale.*

Dose.—15 to 30 minims (**1 to 2 Cc.**). *Subcutaneously, intramuscularly, or intravenously, increased as required.*—*Vide* Refs. *postea.*

These doses contain $\frac{1}{100}$ and $\frac{1}{50}$ grain respectively in a solvent of Glycerin and Water, equal parts. *Note.*—20 Cc. contain $\frac{1}{5}$ grain Antimony Oxide=$\frac{1}{2}$ grain nearly of Antimony Potassium Tartrate.

The Antimony Oxide in fine powder, is heated with the Glycerin, taking care to prevent the decomposition of the solvent, the water being added to the glycerin solution (warm). This produces a permanent preparation.

It is not possible to increase the strength of the Injection when a glycerin and water solvent is used : it is practically a saturated solution. For a stronger preparation a solution in 75% Glycerin, diluted at time of use, is suggested, *v. Injectio Antimonii Fortior.*

The preparation is no doubt **Glyceryl Antimonite** (*cf.* G. T. Morgan, " Organic Compounds of Arsenic and Antimony," 1918, p. 295).

Uses.—Even with the small doses indicated the injection has been effective in Leishmaniasis and trypanosomiasis, stronger doses could, no doubt, be used in bilharziasis. The preparation in dose equal to even 1/20th grain Tartar Emetic is active, hence it is useful when treatment has to be extended over long periods.

The Antimony is in a *reactive* and labile state. **Glyceryl Antimonite** is more easily broken up than Antimony Potassium Tartrate where the component radicals are strongly linked.

The preparations should be tried in syphilis and in malaria. See *Prevention of Malaria, postea.*

TRYPANOSOMIASIS.—C. W. Daniels and H. B. Newham pointed out that successful treatment of these tropical protozoal infections (trypanosomiasis, etc.) entails keeping the disease under control possibly for two years. A case of Rhodesian trypanosomiasis was first treated with atoxyl subcutaneously and antiluetin *per os*. Trypanosomes were easily found in peripheral blood and varied from 1 or 2 to 20 per 200 leucocytes. Antimony Potassium Tartrate intravenously was given and for two or three days afterwards no trypanosomes were seen, but they recurred to the extent of 6 to 24 per 200 leucocyte, on the third or fourth day.

Injectio Antimonii Oxidi in 2 Cc. doses was given (=1/20 grain Tartar Emetic) daily subcutaneously and no trypanosomes were found for 6 days (2 per 200 leucocytes) and next day 3 per 200 leucocytes. On the following day 2 Cc. of the injection were given, and then twice a day for a fortnight, and no trypanosomes were found. *See also* G. C. Low and H. B. Newham, B.M.J. i./22,96.

Subcutaneously it is painless and can be repeated—extended use of the preparation is thought well worth while.—L. i./16,102.

Surg. Rear-Admiral Sir P. Bassett-Smith employed the injection in a case of trypanosomiasis. The dose employed to begin with was 4 Cc. (containing 1/25 grain of Oxide) increasing to 12 drachms (42·6 Cc.) (containing 2/5 grain) ; this was given as an intravenous injection once a week.

As this involved the injection of a considerable quantity of solution, a more concentrated preparation was employed, viz., 1 grain (**0.06 Gm.**) in 4 Cc. of pure glycerin. This was diluted by him four times, viz., to the proportion of 1 grain (**0.06 Gm.**) in 16 Cc. Of this 2·5 Cc. (=1/6 grain Antimony Oxide approx.) were given *intramuscularly* without ill effect.

The object was to give the concentrated intramuscular dose alternately with the intravenous one—the latter has the highest sterilising effect on the blood, but it is not so lasting for killing off ' hidden away ' trypanosomes.

A case with *T. gambiense* infection. At one time he had 4,000 trypanosomes per c.mm. of blood. Under the intravenous injection of Antimony Oxide the blood rapidly *cleared*. In May, 1917, he was again admitted for further course of Antimony as there was relapse, which rapidly cleared up. Each

spring of 1918, 1919 and 1920, he had a course of 10 injections of Antimony Tartrate ½ to 2 grains. Patient working in 1922. It was a severe *T. gambiense* infection cured by Antimony.—B.M.J. i./22,311.

In 'Medical Services of the War,' the Injectio Antimonii Oxidi received favourable mention for use in trypanosomiasis.

KALA-AZAR and ORIENTAL SORE well treated.—A. Castellani, B.M.J. ii./16,552.

AMERICAN LEISHMANIASIS in S. America. Injectio Antimonii Oxidi promising; it may be subcutaneous, intramuscular or intravenous, the last mentioned being the most rapid. *From 1 to 2 Cc. on alternate days or from 5 to 6 Cc. of the solution weekly.* Alternate days appears to have more lasting effect.

(1) Leishmaniasis lesion on nasal septum and forearm cured by 1 to 2 Cc. injections until 30 Cc. reached and by local treatment with Tartar Emetic (saturated solution); (2) lesions of leg and entire mucous membrane of nose and mouth—apparent cure after 58 Cc. intravenously; (3) Ulcer on foot and much ulceration of mucous membrane of nose and mouth; apparent cure after 35 Cc. injected, but relapse later cured by further injections; total of 80 Cc. injected; (4) leishmaniasis of ear—15 Cc. intravenously (1 or 2 Cc. per injection) and 2 applications saturated solution Tartar Emetic effected cure. Unsuccessful in blastomycosis.—E. Escomel, L. ii./17,355; L. i./18,592.

Injectio Antimonii Oxidi Fortior—*Martindale.*

Suggested dose, to be used with extreme caution, 8 to 15 minims (**0·5 to 1 Cc.**) ***diluted*** with 2 or 3 vols. of water and injected immediately, subcutaneously or intramuscularly.—*See Animal Experiments, postea.*

A solution in 75% Glycerin of *strength* 0·5% w/v, i.e. 0·005 Gm in 1 Cc. or 1/12th grain in 15 minims. 1 *Cc. is equivalent to* 0·012 *Gm.* (3/16 *grain approximately*) *Antimony Potassium Tartrate.*

In making the solution, slight heat is employed as mentioned in the previous preparation, neutralising any acidity by the addition of N/1 Sodium Hydroxide.

Chemical and Physiological Note.—The antimony is in a relatively loosely combined condition and hence *reactive.* On dilution with blood serum nascent Antimonious Oxide is precipitated in a fine state of subdivision—ready for reaction with the infective parasites, the tissues and the body fluids. It is probable that all antimonials suffer a breakdown to Antimonious Oxide before they are assimilated.

Uses.—This preparation may permit of the use of bolder doses of Antimony Oxide than with the previously described.

Animal Experiments (*1924*) indicated that the injection given undiluted under the skin of the back of a cat caused swelling and suppuration later. The preparation must be *diluted* at the time of use in man. The ordinary Injectio Antimonii Oxidi is safe, and it is probable that an intermediate strength, *e.g.* 0·25% in glycerin and water will be tolerated. Bassett-Smith gave a 0·36% solution without ill effect.

Prevention of Malaria.

It is known that Quinine given to a patient just previously to his being bitten by infected mosquitoes is of no avail in preventing or delaying onset of the attack. It is possible that an Antimony injection of this type might be effective where Quinine fails.

℞ **Antimonium Tartaratum.** (*B.P.* '14,), F.E. VIII., P. Belg. IV. and P. Ital. V. *Syn.* TARTAR EMETIC. Antimony Potassium Tartrate. FR. CX. 'EMÉTIQUE.'

[21] '*And all preparations or admixtures containing* 1 *or more per ent. of emetic tartar.*'

$[K(SbO)C_4H_4O_6]_2,H_2O = 667{\cdot}798$.

Dose.—Diaphoretic $\frac{1}{25}$ to $\frac{1}{8}$ grain, emetic $\frac{1}{2}$ to 1 grain. *Intravenously* $\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**), usually in 1 or 2% dilution. *Hypodermically* it is painful, irritating and *not advised.*

FR. CX. has *max. single dose* 3 grains; max. in 24 hours 9 grains.

A single dose over limit of safety, *i.e.*, between 0·01 and 0·02 Gm. per kilo veight, is sufficient to cause death.—Fernand Michiels, per Jl. Trop. Med. Sept. 15/22,300.

Colourless crystals made by combining Antimonious Oxide with Acid Potassium Tartrate.

Soluble 1 in 17 of cold water. Almost insoluble in alcohol 90%. ***Incompatible*** with acids and alkalis, soap, and tannin.

Uses.—Diaphoretic and emetic.

In chorea in children it is less dangerous as emetic than apomorphine. It is an active remedy in acute bronchitis often given in combination with opium.

In SLEEPING SICKNESS, Tartar Emetic and **Antimonyl Sodium Tartrate** (*vide postea*) are given *intravenously*, as hypodermically they are too painful. The method alone (without Mercury or some other powerful adjuvant) is not effective, it drives the trypanosomes from the blood, but they still remain in the cerebro-spinal fluid.

Intravenously 1% solution in Normal Saline used in 2 to 10 Cc. doses daily for 5 to 10 days, then every other day or twice a week.

In espundia, granuloma inguinale, kala-azar and oriental sore, tartar emetic has powerful action. Efficacious also in yaws (with other drugs) and beneficial in relapsing fever

CHANCROID well treated. 5 Cc. of a 1% solution intravenously, every second day or at longer intervals; 4 to 6 injections increased by 1 Cc. to a total of 12 Cc.—H. Goodman, Jl. Urology, Apl., '25,489, per Pres., Feb., '26,75.

Castellani's Injection of Antimony Potassium Tartrate (*Intramuscular*).

Form No. 1.

Dose.—$\frac{1}{2}$ to 1 Cc. every other day in the gluteal regions.

Antimony Potassium Tartrate 8 grains, Carbolic Acid 10 minims, Glycerin 3 drachms, Water to 1 ounce.

Form No. 2 contains $\frac{1}{3}$ grain Sodium Bicarbonate in addition.

Both these produce some pain a few hours after administration.

Mistura Antimonii et Potassii Iodidi (*Castellani*).

Dose.—One ounce diluted with 3 or 4 times the quantity of water thrice daily, for adults; $\frac{1}{2}$ doses for children of 8—14 and for European patients.

Antimony Tartrate 1 grain, Potassium Iodide 1 drachm, Sodium Bicarbonate 15 grains, Sodium Salicylate 10 grains, Glycerin 2 drachms (or Syrup 1 drachm or Sodium Tartrate 10 grains), Water to 1 ounce.—A. Castellani, B.M.J. ii./16,552.

The mixture may deposit Antimonious Oxide, but we find it remains clear a reasonable time. All the ingredients must be pure (the presence of Caustic Alkali will cause deposition) and each of the salts must be dissolved separately in a glass mortar *in as much water as possible before mixing.*

YAWS.—This mixture useful in conjunction with Novarsenobillon.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

References to use of Tartar Emetic.

Alarming results may follow Antimony Potassium Tartrate intravenously, due apparently to individual susceptibility or anaphylaxis. —J. B. Christopherson and S. R. Gloyne. L. i./26, 227, 242. The regulation dosage is safe for bilharziasis and nearly a certain cure, but skill in technique and judgment of suitability of cases are needed.

Asphyxia in a woman following 1 grain in 6% solution intravenously. Recovery after intracardiac injection of 0·2 Cc. 1 in 1,000 Adrenalin.—L. ii./31 1325.

Bilharziasis, seventy cases, treated by Antimony Potassium Tartrate at Khartoum Civil Hospital. The solution used is ½ grain in **10 Cc.** of water (a recent revision). It is thought to be the only drug with any direct effect on the disease. ***The dose, always dissolved in 10 Cc. of water (given every other day) is increased by ½ grain every injection until 2 or 2½ grains have been reached and this is maintained.*** (In the case of boys of 16 or under, 1½ grains is the maximum.) The total quantity injected would be 20 or 25 grains according to circumstances. If more than 25 grains is required, the surplus needed should be reserved for a second course. When the dose is 1½ or 2 grains (sometimes before), a cough immediately on injecting indicates that the Antimony is already in the pulmonary circulation and shows that the drug is both rapid and far reaching in its action. Two notable changes occur during the course of injections: disappearance of red blood from the urine but microscopic blood (smokiness) remains till later. The second change (after about 20 grains have been given) is that the urine apparently becomes clear and normal. These changes may coincide with the closing activities of the worm. Daily estimations of the Antimony eliminated during a course show that a third of the total amount of the Antimony given is eliminated. The cumulative action of Antimony may have been over-estimated by the older writers. Bilharzia infection in Egypt on physique and character is disastrous, the backward condition of the peasant (who constitutes 90% of the population) is attributable to this scourge.—J. B. Christopherson and J. B. Newlove —Journal of Tropical Medicine and Hygiene, July 15th, 1919, pp. 129—144.

Not only is the parasite *Schistosoma Hæmatobium* killed *in situ* by the method but later the embryos in the ova deposited in the terminal vessels are killed and the patient therefore ceases to be a carrier.

The Egyptian Fellaheen do not know they are infected. The parent worms, often many hundreds, are situated in the portal vein and its tributaries. The ova working their way from the venule to the surface of the bladder and rectum in order to escape with the urine or fæces may take months to do so. An ordinary uncomplicated case lasts 10 years or more. *S. Hæmatobium* lives for that length of time or longer. Hitherto it has been thought that "no direct or other means is known by which the parasite can be destroyed." (Manson, Trop. Dis., 1918). After about 12 grains have been given in as many days *some* of the ova are shrunken, shrivelled, blackish, etc., and they do not later hatch out in water. When this point is reached the parent worm is held to be killed in the portal circulation and the ova sterilised *in situ*. The patient ceases to be a carrier after about 20 grains. The Antimony Injections should only be given with greatest caution when any important organs—kidneys, liver, heart, lungs, etc.—are not sound.—J. B. Christopherson, L. i./19,1021.

Value in bilharzia, syphilis and leprosy.—F. Gordon-Cawston, M.P.C., Sept. 27/22,261. See also Pommé, Jl. Trop. Med., Jan. 15/23,33.

Contraindications, when the disease is too far advanced, are serious cardiac and renal disease. Initial dose is ½ grain (children under 10, ¼ grain) increased by ½ grain on alternate days, or thrice weekly until 2 or 2½ grains is reached, always using 10 Cc. of water.

'Rheumatic Pains' liable to occur during the night following the 4th or 5th injection. There is increased hæmaturia as treatment proceeds; later, the blood and the ova vanish. Where there is **intolerance,** give brandy, ½ Cc. Adrenalin solution, and ½ Cc. 20% Post Pituitary Extract intramuscularly. 10,000,000 infected Chinese on the Yangtse, and 6,000,000 people in Egypt.—J. B. Christopherson, L. i./24,1071. See also I.M.G., Mar. '25,108.

Other drugs also kill the ova, but no drug deals with bilharziasis so completely because none has so great a parasitotropic action and so little organotropic in comparison. It kills the ova first and then the adult worm.—J. B. Christopherson, B.M.J., March 5, '27,418.

Antimony acts directly on the schistosome, possibly in organic combination.—J. B. Christopherson, B.M.A. Ann. Meeting, B.M.J. ii./28,207. See also paper read at Roy. Sod. Med., Nov. 13, '28.

The treatment is now so popular that often Hindoos, both male and female, with their children, come long distances solely to be injected. Results intravenously absolutely favourable. The bilharzia (and filaria) carrier can always be cured; the bilharzia (and filaria) patient often not. The necessary dose varies widely for different individuals and question arises whether it is right to inject all patients with the dogmatic dose of 200 Cc. (30 grains). Experience from 3,000 injections.—P. H. J. Lampe, Jl. Trop. Med., Jan. 26,4—9.

About 11 million people affected with bilharziasis in India. Tartar Emetic intravenously for 12 days, starting with 0·03 Gm., then 0·06 Gm., then 0·1 Gm. daily to a total of 1·09 Gm., gives complete cure.—Jl. Intrav. Therap., Jan. '26, 2.

In bilharzia its use is generally accompanied by cough, vomiting, and fainting.—M. Khalil and M. H. Betache, L. i./30,234.

Tartar Emetic found effective but difficult to give intravenously in some cases. Sodium Antimony Tartrate and Emetine no advantage. A 6% solution of Antimony Potassium Tartrate in distilled water most convenient, the maximum dose being 2 grains in 2 Cc., and the injections being given on alternate days for 12 injections, commencing with ½ grain and increasing by ½ grain until 2 grains is reached at the 4th injection, when this dose is continued.—M. Khalil, Archiv fur Schiffs-und Tropen-Hygiene, 1926, Band 30, 451—467.

Exceeding the maximum dose causes sudden displacement of the bilharzia parasites, which lose their hold on the vein-walls and are precipitated as thrombi into the liver, possibly resulting in hepatitis, congestion of the bile-ducts, or even septic foci in the pulmonary circulation, if not completely destroyed. The method of choice is gradual destruction over a period of one month.—F. G. Cawston, Jl. Trop. Med. & Hyg., Feb. 16, '31. Chronic appendicitis due to bilharzia is common in Natal, and operation must not be attempted without the previous destruction of the parasites.—*Ibid.*

JAPANESE BILHARZIASIS treated.—J. B. Christopherson, B.M.J. ii./21,551.

Schistosomiasis Japonica treated in incipient cases and those in secondary stage but not in cases with advanced cirrhosis and ascites. Initial dose, 5 Cc. 1% solution intravenously, with total of about 2 Gm. over period of 30 days.—H. E. Meleney, *et al.* Jl. Trop. Med., Apl. 15, '25,165.

Rectal use for bilharziasis. First dose 1 grain, then 2 grains every second day, increasing to 3, 4 and 5 grains during 3 weeks in 100 Cc. of water. Less nausea and results equal to intravenous injections.—H. F. Wilson, B.M.J. i./22,137.

A large single dose per rectum is the only rational treatment. As much as 19 grains have been given (not for bilharzia). After 6 grains, in 4 ounces of warm water, ova disappeared in a case. Half an hour in the recumbent position afterwards is enough.—J. B. Anderson, B.M.J. ii./25,700.

Wilson showed that the rectum is tolerant of large doses of Antimony tartrate (16 grains). Day, in Cairo, showed that 100% of the ova are killed by intravenous injection of 6 grains.—J. B. Christopherson, B.M.J. ii./25,867.

The internal administration of the Liquid Extract of **Male Fern** 1 Gm. *ol.*, "often acts like a charm" in controlling hæmorrhage.—Brooke. In the Zambesi district, the **Wortabel Treatment** with spirit of turpentine with thymol added.—L. ii./07,923. Avoid bathing too long in infected rivers and ponds. This is frequently a direct cause, the parasite entering through the urethra or anus. Bilharziasis is responsible in Egypt for most cases of moderate anæmia in children.—L. ii./11,1328.

Good results from **Thymo-benzene** (2 grains of Thymol in ½ drachm Benzine). Ova passed in shoals on the third day. The urine soon loses all colour of blood. Mild cases in robust subjects lose all trace of infection in a few weeks.—W. Robertson, L. i./16,698.

The intermediate host of the worm is a fresh-water mollusc. The two main species in Egypt have distinct intermediate hosts. Effective means found for rendering infected water safe in military camps.—B.M.J. i./17,832.

A pamphlet (No. 339 Health), issued by J. Alexander Mitchell, the **Secretary for Public Health and Chief Health Officer, Pretoria,** Feb. '26, deals with varieties and distribution of types of bilharzial disease. Slow-flowing streams, pools and lagoons, in Cape Province, Natal, Transvaal, Portuguese E. Africa, Swaziland, and portions of S. Rhodesia, are looked upon with suspicion, as harbouring snails which may be infested with human red-water parasites. Useful precautions are given and a diagram poster showing the snail carrier of urinary and rectal bilharzia. Natural enemies of the snails are trout and duck. The life cycle of the parasite is shown on the diagram.

The presence or absence of bilharzia disease may be ***diagnosed*** by examining the blood serum on the lines of a Wasserman Test, the antigen used being made from the liver of snails infected with the cercariæ of *schistosoma hæmatobium*—Murray, S.A.Med. Rec., May, 1920, p. 168. See also Fairley, L. i./19,1016.

CEREBRO-SPINAL FEVER benefited by ½ grain dose intravenously. A daily remitting temperature fell to normal in 60 hours and remained so.—S. Neave, L. i./16,1101.

KALA-AZAR well treated by Tartar Emetic injections intravenously. *Dose.* —Commence with 4 Cc. of 2% solution and gradually increase up to 10 Cc. Excellent results.—L. Rogers, L. ii./16,782. Except for melancholia and depression, no toxic effects.—H. I. Winifred Kerr, L. ii./18,45.

Kala-azar treated in like manner starting with ¼ grain and rising with two or three days' interval to 2½ grains. Total given 64¾ grains. The case died of influenzal pneumonia and examination of all the organs determined that complete sterilisation of the system had occurred so far as *L. Donovani* was concerned. Given in large doses over long period Antimony produces fatty changes in the liver and kidneys. The solution should not be too concentrated. Antimony Potassium Tartrate is evidently a specific against *L. Donovani.*—G. C. Low, B.M.J. i./19,702.

Compulsory treatment of kala-azar in Assam with Tartar Emetic intravenously ' has converted a disease with a 90% mortality into one with a 90% rate of cure.'—B.M.J. i./25,269.

YAWS. No amelioration after Antimony Potassium Tartrate intravenously in 1 grain doses for 8 to 10 days.—F. T. Auden, B.M.J. ii./22,83.

MALARIA is not combated by Tartar Emetic.—J. Pratt-Johnson and co-workers.—B.M.J. i./21,80. It was originally suggested by Sir L. Rogers. Numerous refs. in 17th Edn. pp. 157,158.

American Leishmaniasis of the skin treated by Antimony Potassium Tartrate beginning with ½ grain, increased to 1 grain—six injections during 14 days. Then a second course starting with 1 grain and gradually increased to 2½ grains.—22 injections in this second course spread over ten weeks—total, 47 grains of Antimony. Each dose was dissolved in 2 ounces of normal saline and sterilised. Cure.—G. C. Low, B.M.J. i./19,479.

Leishmaniasis of the skin is curable by a few grains (5 to 8) of Antimony Sodium Tartrate intravenously. 60 grains or more are needed for Leishmaniasis or kala-azar and possibly more still for trypanosomiasis.—J. B. Christopherson, L. i./21,522. See also H. B. Day, *ibid.* 525,545, and Christopherson, B.M.J.E. ii./23,21.

Cutaneous leishmaniasis in Brazil. Two rare cases described. One cured by Tartar Emetic and the other well treated by Di-Sodo-Luargol.—De Aguiar Pupo, per Jl. Trop. Med., June 1/23,201.

Dermal leishmaniasis is a very widespread disease among the gum gatherers in Mexico, thought to be transmitted by a flying insect, which frequents the forests.—A. Inchaustegui, per Jl. Trop. Med., June 1/23,198.

Tartar Emetic is only slightly germicidal for leishmanias *in vitro*, a 1 in 100 solution being required to kill. Exact mode of action on parasites in human leishmaniasis has not been explained.—H. Noguchi, Int. Conf. Trop. Am., '24,468.

KERATITIS well treated by Tartar Emetic intravenously.—F. G. Cawston, Jl. Trop. Med., May 15/22,127.

GRANULOMA INGUINALE—a disease endemic in Louisiana. Tartar Emetic ıtravenously specific.—I. M. Gage, per Jl. Trop. Med., June 15/23,222.

F. M. Johns is unable to substantiate claim that the organism of granuloma ıguinale is probably identical with Donovan bodies, and concludes that ; is a protozoan parasite. Tartar Emetic 'strikingly specific,' but as damage ɔ the liver is possible interrupt dosage. Usual treatment 5—12 Cc. of a 1% ɔlution intravenously at 2 or 3 day intervals.—Int. Conf. Trop. Am., '24,440—51.

HANCRES.

Chancroidal ulcers well treated by application of 0·5% solution.—E. Rupel, l. A.M.A. i./26,545. Also by intravenous injection of a 1% solution. *nitial dose* 3 Cc., increased by 1 Cc., up to 10 Cc. : injections at 4-day intervals. –A. E. Jones, Jl. A.M.A. i./27,1699.

TRICHINOSIS (one case) well treated with Tartar Emetic, 3 to 4 Cc. of a resh 2% solution *strictly* intravenously for every 10 lbs. weight. Injections iven every second or third day, and dose gradually increased but not beyond 0 Cc. for every 10 lbs. weight.—J. S. Grove, Jl. A.M.A. ii./25,350.

TUBERCULOUS HEMOPTYSIS arrested with Tartar Emetic by the mouth—total daily dose of 0·05 to 0·15 Gm., usually for 5 days, in pills containing ·02 to 0·05 Gm. with 0·01 Gm. of Opium, with water an hour before or after neals.—Presse Med., Oct. 14/25, per Jl. A.M.A. ii./25,1762. See also B.M.J.E. ./25,76.

CANCER.—Injections of a combined solution of Tartar Emetic and Emetine tated to have given good results.—L. i./28,1311.

IN CATTLE harbouring *T. congolense* or *T. vivax* of value—1 Gm. intravenously very 5 days for 6 doses. Of no value in horses infected with *T. brucei*.—Wenyon, 462. Successful in saving the lives of thousands of animals. A orm of Antimony which can be injected subcutaneously is urgently required. –Ll. E. W. Bevan, Trans. Roy. Soc. Trop. Med., Aug., '28,154.

Criticism of statement that 'no treatment has been found to give satisactory results in the case of *T. vivax* infection' (in cattle). After a single ourse of Tartar Emetic injections relapses to *T. vivax* infection are the xception, whereas relapses to *T. congolense* infection are the rule.—H. E. Hornby, Trans. Roy. Soc. Trop. Med., Jan. 30/29,403 ; also J. N. Hall, *ibid.*

℞ **Sterules of Antimony Potassium Tartrate,** ½ grain (**0·03 Gm.**), grain (**0·06 Gm.**), and 2 grains (**0·12 Gm.**) in **1·5 Cc.** (25 minims), Cc. (45 minims) and **6 Cc.** (90 minims), i.e. 2% solutions, are nade. For *intravenous* use.

℞ **Solubes of Antimony Potassium Tartrate** contain 10 grains **0·6 Gm.**) with Sodium Chloride 6 grains (**0·4 Gm.**), on the same ines as those of Antimony Sodium Tartrate, *q.v.*

ulvis Antimonialis. (*B.P.* '14.) JAMES'S POWDER.

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Contains 33⅓ % Antimonious Oxide.

℗ **Pilula Antimonii Conii et Quininæ.**

Dose.—As required in fever.

James's Powder 1 grain, Conium Extract 2 grains, Quinine Sulphate 2 grains. A pill on the lines of this formula had a reputation n Italy for treatment of malarial fevers. A most successful pill ısed in a variety of febrile conditions.

Haustus Emeticus Purgans, Mid. H., 1927.

Antimony Tartrate 1/6 grain, Magnesium Sulphate 60 grains, Water to 1 ounce for a dose.

Unguentum Tartari Stibiati. P. ITAL. V.

Antimony Potassium Tartrate 20 Gm., Lanolin or Vaseline 80 Gm.

℗**Vinum Antimoniale** (*B.P.* '14.).

Note.—℗ *Preparations or admixtures containing Antimonial Wine.*

Dose.—10 to 30 minims (**0·6 to 2 Cc.**) ; as emetic 2 to 4 drachms (**8 to 15 Cc.**) ; contains 1 in 250 by volume.

F.I. (Second Int. Conf. 1925) is similar. Ph. Ned. V. has this.

Flavoring.—It has little taste when diluted.

Pneumonia is well treated by repeated 2½ minim doses of Antimonial Wine. Crisis comes at the end of the fourth day.

HEADACHE DUE TO HIGH BLOOD PRESSURE.—Especially of value where chronic interstitial nephritis is a contraindication to Blue Pill.—A. Feiling, B.M.J. ii./30,907.

For further uses see Antimonium Tartaratum.

Antimonii et Sodii Tartras. **Antimonyl Sodium Tartrate.** $[Na(SbO)C_4H_4O_6]_2H_2O=635·592$. (*It is not a Poison within the meaning of the Act.*)

Dose.—*Per os*, presumably on the lines of Tartar Emetic.

Intravenously, ½ to 2 grains (**0·03 to 0·12 Gm.**) usually in 1 or 2% dilution.

Hypodermically it is not advised.

Manufacture.—Boil Antimonious Oxide 10 in a solution of Sodium Acid Tartrate 13 until almost clear (the quantity of Antimonious Oxide is purposely in slight excess). Filter and evaporate to dryness. When dried at 105° C. the substance retains ½ H_2O. Plimmer has shown that by adding alcohol to the concentrated solution the compound crystallises out with 2½ H_2O. There is no great advantage in this method. Furthermore, we have found that much of it remains in the mother liquor. The body is a white crystalline powder. ***Solubility.*** 1 in 1½ of water.

Uses.—This compound has properties similar to Tartar Emetic, Its greater solubility may be of some advantage. It is stated to have the lowest degree of toxicity of the Antimonials for intravenous injection—Chopra and Napier, I. M. G. Jan. 1923. It has been largely employed in bilharzia infection, in which it is effectual. Kala-azar has been treated with it.

It has also been used in syphilis and in trypanosomiasis.

Sterules of Antimony Sodium Tartrate.—½ grain (**0·03 Gm.**) 1 grain (**0·06 Gm.**), and 2 grains (**0·12 Gm.**) in **1·5 Cc.** (25 minims), **3 Cc.** (45 minims) and **6 Cc.** (90 minims) respectively, *i.e.* 2% solutions, are made.

Antimony Sodium Tartrate Solubes 10 grains (**0·6 Gm.**), combined with Sodium Chloride (**0·4 Gm.**). These, on dissolving in 40 Cc. of distilled water and boiling produce a solution for injection. 2 Cc. contain ½ grain (**0·03 Gm.**). Convenient in the Tropics—J. B. Christopherson, L. i./24,1091.

CAUTION.—*One-third of the amount of Antimony injected is excreted by the kidneys in 24 hours. Great caution required where heart, kidney or lung disease exists. In weak, emaciated and anæmic subjects begin with small dose gradually increased.—R. N. Chopra, per Jl. Trop. Med., April* 16/23,133.

BILHARZIASIS.—For abstract of literature, see Tartar Emetic.

KALA-AZAR well treated intravenously. Begin with small dose, 0·5 Cc. of 2%, increasing by 0·5 Cc. up to a maximum of 5 Cc., and continue for 2 to 4 months as required. Heart, kidneys and lungs must function well.—R. N. Chopra and L. E. Napier, Ind. Med. Gaz., Jan. 1923, per B.M.J.E. i./23,45. Jl. Trop. Med., Mar. 1/22,64.

ORIENTAL SORE.—5 to 10 Cc. of 1% solution intravenously daily, or less often, until healed.—A. W. Sheen, Pr. Feb. 21, p. 85. See also J. B. Christopherson, Jl. Trop. Med., June 1/23,205. Oriental sore in Russian Turkestan—well treated with 2% solution.—Maj. J. A. Sinton, per Jl. Trop. Med., June 1/23,200.

FILARIASIS is not cured by Antimony Tartrate intravenously.—G. C. Low, L. i./21,221. (Sir L. Rogers tried Antimony Sodium Tartrate.)

GRANULOMA PUDENDI well treated. Salvarsan useless.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

LEISHMANIASIS OF THE SKIN is treated with this and Tartar Emetic *q.v.*

SYPHILIS treated intravenously. Initial dose ½ grain, increased to 1½ or 2 grains—in 3 Cc. of water. In one case 23 grains total. Results not inferior to those with Arsenic.—F. G. Cawston, B.M.J. i./22,266.

TUBERCULOUS DISEASE of the lungs and of the eye treated. Tartar Emetic (intravenously) deserves further trial.—F. G. Cawston, B.M.J. i./24,820.

TRYPANOSOMIASIS.—In the experimental treatment in rats 0·5 Cc. of 1% solution per Gm. weight considered maximum dose. Its quickness of action is remarkable. A few persistent forms can still be found in the liver. They need to be tired out by successive doses.—Plimmer and Thomson.

Some cases tend towards a natural recovery and appear to respond well to treatment, others get progressively worse in spite of remedies.—Wenyon.

Earlier Refs. in trypanosomiasis.—Edn. XIX., p. 167.

Unguentum Antimonii. We have made this ointment containing 5% and upwards of finely powdered Metallic Antimony in a basis of Lanolin Ointment for use in skin affections.

Urea Stibamine is composed of Urea and *p*-amino-phenylstibinic acid $NH_2C_6H_4SbO.(OH)_2$, but apparently not a definite compound.

KALA-AZAR. Safer than Tartar Emetic. An effective intravenous dose stated to be 0·25 Gm.—U. N. Brahmachari.—Ind. Jl. Med. Res., 1922, Y.B.P., '23,64. *See also* Jl. Trop. Med., July 15/24,203. I.M.G. '24,391 and 464.

Intravenous injections on alternate days, starting with 0·1 Gm. in cold sterile water, increasing by 0·05 Gm. to a maximum of 0·25 Gm. and continued for subsequent doses. Rapidity of disappearance of symptoms compared with Sodium Antimony Tartrate, 2 to 3 weeks as against 3 months.—H. E. Shortt and Ram Taran Sen, I.M.G. 1923,289; C.D., Feb. 23/24,259.

Reactions following administration.—L. E. Napier, I.M.G., Nov. '26,559. *See also* N. Chatterjee, I.M.G., June '26,284; I.M.G., June, '26,291.

LEISHMANIA well treated.—U. Brahmachari and R. Banerjea, Jl. Roy. Soc. Trop. Med., Nov. 25,'29,301.

Further notes on kala-azar treated with organic Antimony compounds.—U. Brahmachari and Co-workers, Tr. Roy. Soc. Trop. Med., Apl. 17,'30,617; Nov. 25, '30,351.

'Aminostiburea' is said to be a compound of *p*-amino-phenylstibinic Acid with Urea and Glucose. In Kala-azar.—L. E. Napier, I.M.G., Dec., '25,571.

Stibamine Glucoside.—A compound containing 30% Antimony and allied to *p*-amino-phenylstibinic acid. It has a m.l.d. of about 500 mgm. per kilo. Average duration of treatment about a month. Initial dose 0·1 Gm. of 4% solution intravenously, 0·2 Gm. the maximum for patients weighing over 50 lbs. Injections on alternate days.—L. Napier, I.M.G., Jan., '25,24.

✱**'Neostam'** (T.M. 464,641). A brand of Stibamine Glucoside (**the Nitrogen-glucoside of Sodium *p*-Aminophenylstibinate**), available in phials of 0·05, 0·1, 0·2, 0·5 and 1 Gm. for use in Kala-azar, etc.

✱**Neostibosan** (T.M. 491346). *Syn.* '693 B.' Diethylamine-*p*-Aminophenyl Stibinate now supersedes both Stibenyl and Stibosan. In kala-azar. Initial dose 0·05 to 0·2 Gm. according to age intravenously; 8 injections on 8 consecutive days for intensive treatment. *See also* B.M.J.E. i./31,65.

✱**Fouadin** (T.M. 503040). Sodium Antimony Pyrocatechin-disulphonate, Schistosomiasis cured by intramuscular injections of 1 to 5 Cc. of 7% solution. Local reaction slight, and no deaths or serious symptoms occurred in 20 cases. 2 weeks treatment gives cure.—B.M.J.E. ii./29,92.

SCHISTOSOMIASIS in W. African children. Given intramuscularly, the total course of treatment being equivalent in Ccs. to the weight of the child in kilos; given in 10 doses, the third to the tenth being equal and given on alternate days; the first injections given on consecutive days and being about 30%

and 70% respectively of succeeding full doses. Of 6 cases treated all were clear of ova by the twenty-fourth day, but there was loss of weight and considerable local pain.—R. M. Gordon and E. P. Hicks, Ann. Trop. Med., Oct. 22/1930.

Nine intramuscular injections for an adult, cure in the majority of cases. First day, 1·5 Cc.; second, 3·5 Cc.; third, 5 Cc.; fifth, 5 Cc.; seventh, 5 Cc.; ninth, 5 Cc.; eleventh, 5 Cc.; thirteenth, 5 Cc.; fifteenth, 5 Cc. If ova found give further two doses.—M. Khalil and M. H. Betache, L. i./30,234.

Advantages over Tartar Emetic—duration of treatment 10 days less, and absence of local complications. Disadvantages—greater expense; sometimes causes brachycardia; preparation a monopoly.—B.M.J. ii./31,1191.

LEISHMANIASIS cured. No pain intramuscularly.—L. ii./31,1145.

Aromatic Stibinic Acids containing Phenyl and Quinolyl radicals. It was not found possible to prepare the Stibinic analogue of Tryparsamide (Sodium *N*-phenyl-glycineamide-*p*-stibinate), which Brahmachari claims to have isolated. *m*-amino-phenyl-stibinic Acid is however much more stable than the *p* acid.

The material supplied by Brahmachari did not agree with theory, but it has been efficacious in the East clinically.—Prof. G. T. Morgan, Brit. Assn. Meeting, Bristol, 1930.

The following *inter alia* have been prepared and their trypanocidal action has been determined by Professor Warrington Yorke under the Chemotherapy Comm. of the M.R.C. They were given intraperitoneally and were found to possess only slight activity against *T. equiperdum.* The M.L.D.s are given in mgr. per 20 Gm. mouse, Sodium *m*-aminophenylstibinate being included for comparison.

SUBSTANCE.	M.L.D.
Sodium *m*-aminophenylstibinate.	25
Sodium *m*-carbamidophenylstibinate	25
Sodium *N*-phenylglycineamide-*m*-stibinate	20
Sodium *N*-phenylglycinemethylamide-*m*-stibinate ...	30
Acetylated 3-amino-4-hydroxyphenylstibinic acid ...	10
Sodium Quinolyl-5-stibinate	1·8
Sodium Quinolyl-6-stibinate	3·6
Quinolyl-8-stibinic acid...	0·9

—G. T. Morgan and J. W. Cook (Chem. Res. Lab., Teddington), J.C.S., April, 1930.

Antimonial Analogues of the Carbazole Series.

A description of certain organic derivatives in which Antimony replaces Nitrogen in the Carbazole nucleus, the starting material in the research being *o*-aminodiphenyl prepared from commercial Diphenyl. Xenyl-*o*-stibinic Acid $C_6H_5.C_6H_4SbO(OH)_2$, Xenyl-*o*-stibine Tetrachloride $C_6H_5.C_6H_4.SbCl_4$, Xenyl-*o*-stibine Dichloride $C_6H_5.C_6H_4.SbCl_2$, Xenyl-*o*-stibine Di-iodide $C_6H_5.C_6H_4.SbI_2$, Xenylenestibine Iodide $(C_6H_4)_2:SbI$, Xenylenemethylstibine $(C_6H_4)_2:Sb.CH_3$, and a number of other derivatives are described.—G. T. Morgan and G. R. Davies (Chem. Res. Lab., Teddington), Proc. Roy. Soc. A., Vol. 127, 1930.

The pharmacological action of organic Antimony derivatives.—R. N. Chopra, I.M.G., Apl. '26,162.

For further Organic Antimony Compounds, see Vol. II.

APIOL (LIQUID).

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**), in **Perles**, 3 minims in each, or **Capsules** 3, 5, and 10 minims.

Liquid Apiol is obtained from, and contains the active properties of, the fruit of *Carum Petroselinum, Syn. Apium Petroselinum, Petroselinum sativum,* common parsley. It is a green oil, with a peculiar odour and a pungent taste like parsley. Soluble readily in alcohol and ether.

The only substance to which the name Apiol can be correctly applied is the crystalline Stearoptene, previously in the Fr. Cx. The essential oil of Parsley appears to be the only body worthy of the name liquid Apiol and that only from an Apiol-bearing variety of parsley.—J. F. Walmsley, P.J. ii./28,89. P. Belg. IV. has the Liquid preparation.

Liquid Apiol has decided efficacy in primary amenorrhœa or deficiency of secretion, as well as in accidental suppression and in dysmenorrhœa. Should be given night and morning for 4 or 5 days during the time.

Parsley contains no alkaloid; *cf. Æthusa Cynapium.*

℗ **Capsules of Liquid Apiol and Ergotin.**

Contain Liquid Apiol 5 minims (**0·3 Cc.**) and Ergotin 2 grains (**0·12 Gm.**).

℗ **Ergoapiol.** Under this name capsules are supplied for amenorrhœa, dysmenorrhœa and allied disorders.

Gall Stones treated by infusion of parsley—a double handful of fresh parsley leaves soaked in cold water, which was afterwards brought to the boil, strained and allowed to cool. *Dose*: 1½ pints daily. Obviated operation for years.—H. C. Kidd, B.M.J. ii./20,244.

Apiol, Crystallised. '**White Apiol**' Éther Méthylénique et diméthylique de l'Allyl-apionol. Camphre de Persil. F.E. VIII. (Was in Fr. Cx.) $CH_2 : O_2 : C_6H(OCH_3)_2CH_2.CH. : CH_2$= 222·1092.

In acicular crystals. For amenorrhœa a solution in olive oil containing 3 grains (**0·2 Gm.**) in 15 minims (**1 Cc.**) has been given—injected once daily for some days before the period. Also given as a quinine substitute in malaria.

Apium graveolens. (*Umbelliferæ*) Ache des Marais.—Fr. Cx. Celery. The entire herb is used in '**Sirop des Cinq racines.**'

Oil of Celery. *Dose.*—½ to 3 minims or more. **Capsules** are made 3½ and 5 minims. Contains a small proportion of Apiol. Antispasmodic and nerve stimulant.

In rheumatoid arthritis 5 to 15 minim doses have been used successfully. It acts probably as an intestinal antiseptic.

℗ APOMORPHINÆ HYDROCHLORIDUM.

℗ *Apomorphine and its Salts.*

℗ **Apomorphine Hydrochloride** (*B.P.* '14). U.S. X., P. Helv., P. Jap., P.G. VI., Ph. Ned. V. Chloretum Apomorphicum, P. Dan., P. Ital. V., F.E. VIII., P. Belg. IV.

For details of the Chemical Formula of this body, see Vol II.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**), increased, as an expectorant (not official); $\frac{1}{10}$ to $\frac{1}{4}$ grain (**0·006 to 0·016 Gm.**) as an *emetic per os*; $\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003 to 0·006 Gm.**) as *emetic hypodermically.*

A derivative of morphine or codeine obtained by heating them with an excess of hydrochloric acid in sealed tubes. In commerce the hydrochloride occurs in greyish white, acicular crystals.

Misleading to describe the reaction in making Apomorphine as due to loss of a molecule of H_2O.—D. B. Dott, P.J. i./31,516.

Soluble.—1 in 60 of water, 1 in 5 of alcohol 90%. Insoluble in ether and chloroform. A trace of acid prevents solutions turning green, *vide* Injectio *postea.*

Incompatible with sodium carbonate and bicarbonate, tannin and iron salts.

Uses.—*In all cases of poisoning it is of great value as an emetic.* It is an anti-stimulant; in bronchial asthma doses of $\frac{1}{6}$ grain are very useful. Small doses are expectorant and relieve bronchitis and pertussis. In puerperal convulsions it soon causes vomiting and free perspiration; patient sleeps and awakes quiet.

In a case of obstruction of the œsophagus by a plumstone, the injection of Apomorphine hypodermically caused its removal.

Ⓟ**Tabellæ Apomorphinæ,** $\frac{1}{100}$ grain (**0·0006 Gm.**) and $\frac{1}{50}$ grain (**0·0013 Gm.**) in each, with chocolate.

Ⓟ**Injectio Apomorphinæ Hypodermica.** (*B.P.* '14).

Apomorphine Hydrochloride 1, Diluted Hydrochloric Acid 1, Distilled Water to 100. $\frac{1}{10}$ grain in 11 minims.

Dose.—5 to 10 minims (or more) as an emetic. The addition of the trace of acid keeps it stable and colourless.

The following will also remain colourless:—Shake Apomorphine Hydrochloride 1, with Alcohol 90% 50; add Water 140 and finally Diluted Hydrochloric Acid 10.—Pharm. Zeitung 61,640. We found the formula satisfactory.

The effect produced by a small injection on a mad-drunk patient is remarkable. As hypnotic $\frac{1}{40}$ to $\frac{1}{20}$ grain. The patient, however wild, sleeps 12 hours and awakes refreshed.—B.M.J. ii./13,663.

Ⓟ**Hypodermic Tablets** are prepared containing $\frac{1}{20}$, $\frac{1}{15}$ and $\frac{1}{10}$ grain in each. Ⓟ **Sterules, Hypodermic** contain $\frac{1}{10}$ grain.

Ⓟ**Syrupus Apomorphinæ (Hydrochloridi), B.P.C.**

Apomorphine Hydrochloride 0·05, Diluted Hydrochloric Acid 0·25, Alcohol (90%) 4·5, Distilled Water 4·5, Syrup to 100.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**), contains $\frac{1}{30}$ grain Apomorphine Hydrochloride in 1 drachm.

Ⓟ**Linctus Apomorphinæ cum Codeina.** (Adopted by St. G. H.)

Dose.—1 drachm (**4 Cc.**).

Apomorphine $\frac{1}{50}$ grain, Codeine Phosphate $\frac{1}{12}$ grain, Dilute Hydrocyanic Acid 2 minims, Syrup of Virginian Prune to 1 drachm.

A useful expectorant.

Ⓟ**Mistura Apomorphinæ Composita** (*Syn.* **Mistura Tussis** *Luff.*) *Dose.*—Half ounce every four hours.

Apomorphine Hydrochloride 1/48 grain, Morphine Hydrochloride 1/24 grain, Heroin Hydrochloride 1/24 grain, Dilute Hydrochloric Acid 5 minims, Syrup of Virginian Prune $\frac{1}{2}$ drachm, Chloroform Water to $\frac{1}{2}$ ounce.

A palatable mixture useful for irritable cough, expecially post-influenzal cough. The hydrochloric acid effectually prevents the precipitation of any of the alkaloids.

AQUÆ CONCENTRATÆ.

These are made 40 times as strong as the distilled Aromatic Waters by dissolving the requisite amount of Essential Oils in 70% Alcohol. They keep good any length of time in any climate

The following amounts of Essential Oil (or ingredient) make 100 parts of concentrated water :—

Aqua Anethi Conc.	8·0	Aqua Cinnamoni Conc. ...	8·0
,, Aurantii Floris Conc. ...	8·0	,, Foeniculi Conc.	8·0
,, Camphoræ Conc. (Camphor) ...	4·0	,, Menthæ Piperitæ Conc.	8·0
,, Carui Conc.	8·0	,, Pimentæ Conc. ...	5·0
,, Chloroformi Conc. ...	10·0	,, Sambuci Conc.	1·0

The more soluble Terpeneless and Sesquiterpeneless Oils may be used

ARGENTUM.

Ag=107·88.

Leaf Silver as wound dressing.—L. ii./29,1166.

Argenti Acetas. $CH_3COO\,Ag$=166·9034.

In white crystals, *soluble* in water. A 1% solution for purulent ophthalmia in infants. Dilute Salt Solution may be used after it.

OPHTHALMIA NEONATORUM is prevented by Silver Acetate as well as by the Nitrate ; causes less catarrh.—B.M.J.E. i./26,39.

℞ **Argenti Cyanidum.** AgCN=133·89.

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**)

White powder containing 80·48% Ag. Antipyretic occasionally used in epilepsy and chorea.

℞ **Pilula Argenti Cyanidi** contains $\frac{1}{60}$ grain.

Recovery of Silver in the electrolytic refining of Copper. Electro-plating, using Silver Cyanide and Potassium Cyanide. Silvering of mirrors.—G. Malcolm Dyson, P.J. ii./29,117.

Argenti Chloridum. AgCl.=143·337.

VARICOSE ULCERS.—Silver Chloride suspension made in the presence of protective found to be useful, employing 1 to 10% dilutions. 4% usually employed.—B.M.J.E. ii./26,44.

Argenti Iodidum Recens. Ag I=234·812.

In the freshly precipitated form this salt has been used in cases of ophthalmia. It has astringent properties stated to be almost as good as Adrenalin.

URETHRITIS.—Nascent silver iodide in 3% suspension may be produced from silver nitrate 2·2 Gm., potassium iodide 2·2 Gm., distilled water 50 Cc., mucilage of Irish moss N.F. to 100 Cc. For a light flocculent precipitate dissolve each in 50 Cc. of water. To produce a coarse precipitate the salts are separately dissolved in 5 Cc. of water, shaken and diluted with the mucilage. Gelatin 0·3% has also been used to dissolve the Potassium Iodide.

Corneal opacities, conjunctivitis and pannus have been treated, commencing with 1% strength. In ulcer of the cornea it should be used cautiously. For gonorrhœal ophthalmia most efficacious. One drop of weak solution instilled three times a day or oftener in cases of extensive chemosis and danger of corneal sloughing, alters the condition in a few days.—P. Moloney.

Neoprotosil.—A colloidal protein-Silver Iodide compound, containing about 20% Silver Iodide in scales, readily soluble in water, but when making solution the container should be briskly shaken for a minute. The solution is bland and bactericidal in urethritis, inflamed conditions of the eye, ear, nose and bladder, etc.—L. ii./22,298.

Neoprotosil Capsules.—One dissolved in 2 drachms of water forms a 5% solution.

Argentide.—A concentrated Solution of Silver Iodide, containing 100 grains in each ounce. A small quantity added to water causes a precipitate of silver iodide for cystitis, gonorrhœa and conjunctivitis.

Cystography.—A 5% Silver Iodide emulsion makes a good opaque medium and has soothing antiseptic action on the bladder. Also of value for urethrograms—distend urethra by means of syringe and inject solution during entire time of exposure.—W. F. Braasch, "Urography," reviewed B.M.J. i./28,849.

Argenti et Potassii Iodidum. Silver Potassium Iodide. $KAgI_2$.=400·844.

The double Iodide of Potassium and Silver (Mellor's Inorg. and Theor. Chem.). A crystalline substance readily soluble in water. Silver Iodide is precipitated on dilution but precipitation is not complete until a fairly high dilution is reached.

Preparation of an Injection.—One part of crystallised Silver Potassium Iodide and 4 parts Potassium Iodide are dissolved in water, as required, in strengths of 0·5 Gm., 1 Gm., and 1·5 Gm., in 20 Cc. in each case. Each of the dilutions contains a fine suspension of Silver Iodide and a solution of the double salt.

Uses.—In gonorrhœa the injection of 20 Cc. into the meatus (apply tight bandage over glands for 15—30 minutes after injection), causes a rapid decrease of discharge after 6 injections and a complete disappearance of gonococci after 12 to 15 injections. Injections need only be given twice or thrice weekly, as Silver Iodide persists in the urethra.—S. R. Naidu, B.M.J. i./27,139.

Argenti Nitras. $AgNO_3$=169·88. *Syn.* Lunar Caustic.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) in a pill, best with kaolin ointment as an excipient.

Incompatible with organic material, *e.g.*, rose water, if used instead of distilled water for preparing a lotion of pigment; also with Tartaric Acid, Hydrocyanic Acid, Iodine, Iodides and Bromides.

Soluble 1 in 0·53 of water and 1 in 20 of alcohol 90%.

Uses.—As a caustic and stimulant to promote healing. Small doses internally check diarrhœa of children. In typhoid, where there is hæmorrhage $\frac{1}{6}$ grain every 3, 4 or 6 hours, or even as often as every 2 hours. Rectal injections are also useful for the bleeding of dysentery (60 grains in 3 pints). In laryngeal phthisis a spray $\frac{1}{4}$ to 2 grains to the ounce.

In vomiting of pregnancy $\frac{1}{6}$ grain in a wine-glass of water every 6 hours has been found effective. In gastric ulcer $\frac{1}{3}$ grain in a pill 3 or 4 times daily half an hour before food useful. Solutions have also been used. In eczema of the flexures and particularly of mucous surfaces, Solution 2 to 3%, alternating with Lotio Calaminæ Oleosa is valuable. Pigments, 2 to 5% are used for the throat, and applied to ulcers as a stimulant. Lotions and eye-drops vary from 1 in 1,000 to 1 in 100. Purulent ophthalmia is treated with 1 to 2% drops. Ulcerative stomatitis is well treated by 0·5 to 2% Solution.

Glycerin 15% added to $\frac{1}{2}$ to 2% silver nitrate solution renders it less painful, and possibly more effective.

Silver Nitrate is on the alert to react (*e.g.*, precipitate with soluble chloride) in such manner that its electrical state and stability of its ions are altered—herein lies its nature.—Burdon Cooper.

War wounds have been treated by spraying with very dilute Solutions—see **Wounds,** Therap. Index.

Silver Nitrate stains on the skin may be removed with Mercuric Chloride solution.

Urethral and Vaginal Injections. 0·02 to 0·2% (1 in 5,000 to 1 in 500) usually employed.

In lavage of the entire urethra 2 grains to the pint (1 in 5,000 approx.) is sufficiently strong. Hydrostatic pressure may be used, *i.e.*, the container being about 5 feet above the couch, instead of a syringe.

Silver Nitrate has more penetrating effect than any organic Silver compound and should be adhered to as a standard remedy for injection treatment o gonorrhœa.—Brit. Jl. Ven. Dis., Oct. '25,245, per Pres., Feb. '26,78.

CYSTITIS: Diagnosis and treatment. Against Urotropine there are innumerable failures. Ideal urinary antiseptic not found. With regard to lavage, Silver Nitrate best. A weak solution, 1 in 20,000 first, gradually increased. Eusol as accessory to supra-pubic drainage; rarely with catheter —too painful. Vaccines useless.—J. F. Dobson, B.M.J. ii./21,305.

EPITHELIAL TUMOURS OF THE URINARY BLADDER. The old-fashioned Silver Nitrate washes still hold the field. A patient had the bladder washed out over 2,000 times. Diathermy more rapid.—F. Kidd, L. i./23,582.

WHOOPING COUGH treated by painting the throat every two days with 2% Silver Nitrate Solution—success attributed to suggestion rather than bactericidal action.—L. i./21,1312.

CREEPING DISEASE (PSEUDO-MYIASIS), a suspected case of, successfully treated with Nitrate of Silver.—A. Gambier, per Jl. Trop. Med., April 16/23,133.

Antidote to Silver Nitrate.—Common salt, given in some demulcent drink (excess should be avoided as it is very irritant to the stomach). Salt is also used to arrest its action locally as a caustic. The pain caused by application of solutions of silver nitrate may be alleviated by previous application of a solution of cocaine nitrate.

Argyria produced. Inside of nose repeatedly painted for 18 months, and after an interval of a year nose and throat painted practically daily. Prolonged use dangerous.—per Clin. Jl. Jan. 3/23,6.

A mixture of 0·25% Potassium Ferricyanide and 6% Sodium Thiosulphate injected intradermally quickly removed discoloration.—per Pres., Oct. '28,324.

Ferricyanide 1% with Thiosulphate 6% removes a large part of the Silver from the skin in old cases with deep pigmentation. As many as 200 injections may be made in 2 hours. A small dose of Morphine and Atropine cuts short biting of the injection.—A. W. Stillians and T. K. Lawless, Jl. A.M.A. i./29,21.

Stains on hands caused by Silver Nitrate are best removed by Potassium Cyanide. Or by first wetting with tap water, rubbing Potassium Iodide crystals over the area and allowing to remain on the skin for several hours.—W. W. Wilkerson, Jl.A.M.A. i./32,72.

Liquor Argenti Nitratis, R.O.H.—4 to 8 grains to 1 ounce (1 to 2% approx.).

In ulcerative blepharitis 1 or 2% solution a sovereign remedy; Protargol 10% or Argyrol 20% may be employed.—R. A. Greeves, L. ii./23,997.

As prophylactic, drops should not be used in stronger solution than 1%, and caution needed if used more than once or twice. Case of conjunctival hæmorrhage following 5 instillations of 1·5% solution.—L. i./28,716.

Urethral Bougies of Silver Nitrate contain ½ grain with Theobroma basis. Give good results in obstinate cases of gonorrhœa.

Argenti Nitras Fusus. U.S. Contains 94·5% of Silver Nitrate. Silver Nitrate 100 Gm., Hydrochloric Acid 4 Gm. Melt at low temperature and pour into suitable moulds.

Argenti Nitras Mitigatus (*B.P.* '14). *Syn.* MITIGATED CAUSTIC. Silver Nitrate 1, Potassium Nitrate 2, fused together and moulded into sticks for use as caustic.—P. Jap. uses equal parts.

Argenti Nitras Induratus, Toughened Caustic (*B.P.* '14). Contains 5% of potassium nitrate moulded into caustic points.

For the use of Silver Nitrate in preparation of Hair Dyes, see Vol. II.

Pigmentum Argenti Nitratis Æthereum, L.H. Silver Nitrate 10 grains, Distilled Water 1 drachm, Spirit of Nitrous Ether to 1 ounce. Caustic even when painted on a greasy skin. 3 to 10 grains to the ounce relieves pruritus ani and pruritus vulvæ.

[D] [P] **Pilula Argenti Nitratis et Morphinæ Acetatis, Crocq's Pill,** contains $\frac{1}{6}$ grain of each salt made with Kaolin Ointment.

Unguentum Argenti Nitratis Compositum. *Syn.* UNGUENTUM BILLROTHI, Ph. Ned. V.

Silver Nitrate 1, Peru Balsam 5, Yellow Soft Paraffin 94.

Pigmentum Delineans K.C.H.

No. 1, Silver Nitrate 5 grains, Water 1 ounce. No. 2, Pyrogallol 10 grains, Water 1 ounce. The solutions are used in conjunction.

Argenti Oxidum. *B.P.* '98. $Ag_2O = 231{\cdot}76$.

Dose.—$\frac{1}{2}$ to 2 grains in a pill with kaolin ointment.

Is not so caustic in action as silver nitrate. Continued administration may discolour the skin. It readily yields its oxygen, and will explode (if mixed) with such bodies as phenol and creosote.

Uses.—Has been given in epilepsy, chorea, and dysentery. It stains the skin less than the nitrate.

Argenti Fluoridum (soluble 1 in 2), **Argenti Citras** (hardly soluble), and **Argenti Lactas,** are occasionally used by urethral injection, strength 1 in 5,000 upwards, in gonorrhœa.

✱**Argyrol** (T.M. 255098).—*Syn.* VITELLIN. ARGENTUM VITELLINATUM, P. Belg. IV., PLATA VITELINA, F.E. VIII.

A vegetable protein compound containing about 30% of silver.

Soluble in water in all proportions—solutions keep well. ***Incompatible*** with Cocaine Hydrochloride (confirmed, P.J. i./32,282. 10% found compatible with 1% Atropine Sulphate—*ibid.*) In purulent conjunctivitis (gonorrhœal, neonatorum, etc.), free instillation of 25% solution every 3 or 4 hours; catarrhal conjunctivitis, 5 to 20% one or more times daily; trachoma, 25% solution rubbed with force on wool into lids once daily; dacryocystitis, corneal ulcers, etc., 25% solution.

Numerous critical views as to its efficacy have been published.

Ulcerative colitis has been treated by washing out with 1½ pints of 1% Argyrol solution at 80° F.

Unguentum Argyrol 2% with paraffin basis in eczematous conjunctivitis and keratitis. **R.O.H.** has 20%.

Suppositories containing 1 to 4 grains have been used.

Argento-Proteinum Mite. *Syn.* MILD SILVER PROTEIN, MILD PROTARGIN, U.S. X.

Contains not less than 19% or more than 25% Silver. It is in dark brown or almost black shining scales or granules. It is therefore of the Argyrol type (*cf.* N.N.R., 1925).

✱**Collargolum** (T.M. 219555), **Colloid Silver.**—*Syn.* ARGENTUM COLLOIDALE, P. Jap. IV., ARGENTUM CRÉDÉ. PLATA COLOIDAL F.E. VIII.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in pills or solution.

ARGENT COLLOIDAL (COLLARGOL). FR. CX. Nouv. Supp. '26 (and P.G. VI.). Contains at least 70% Silver in combination with albuminoid substances. Soluble slowly 1 in 25 in cold water. The precipitate obtained on adding saturated solution of Sodium Chloride re-dissolves on further addition of water.

P.G. VI. says, on adding dilute mineral acids to aqueous solution, a precipitate forms which re-dissolves on neutralising with alkalis. Ph. Ned. V. requires 74·5 to 80% Silver. P. Svec. X. 72 to 80%.

Collargol Tablets contain $\frac{3}{4}$ grain (0·05 Gm.).

Black scales, miscible in all proportions with water, but does not form a clear solution even when dilute.

Internally has been used for gastric and intestinal catarrh; also *intravenous* injections of a ½ to 1% solution for septic affections such as endocarditis, also in difficult labours where septic complications feared. 0·1 to 0·15 Gm. in 1% solution as a dose.

For ophthalmic use 1 to 10% solutions are employed.

Diphtheritic membrane is said to disappear under swabbing with 5% solution.

B. Coli and other infections of the urinary tract satisfactorily treated with various strengths (0·5 to 4%).—H. H. Sanguinetti, B.M.J. i./25,1168.

Suppositories of Collargol 2½ grains, also Ⓟ**Compound Collargol Suppository,** Collargol 2½, Ethyl-Morphine Hydrochloride ⅔, Extract of Indian Hemp 2 grains, Glycerin and Cacao Butter *q.s.* In pelvic suppurations with pain, tenderness and general septic symptoms.

Unguentum Crédé. Collargol 15, Adeps Benzoatus 75, Cera Alba 10.

For eczema, syphilis and gonorrhœa, and as a prophylactic to gonorrhœal ophthalmia.

Argentum Proteinicum, P.G. VI., Ph. Ital. V., P. Jap. IV., Ph. Ned. V., F.E. VIII. and P. Helv. (8% Ag.). P. Belg. IV. *Syn.* ✱Argein (T.M. 364945); ✱Protargen (T.M. 368227); ✱Protargol (T.M. 322555). P. Austr. Argento-Proteinum Forte, 'Strong Silver-Protein,' U.S. X. P. Svec. X. 7·8 to 10% Ag.

Dose (internally).—1 to 3 grains (**0·06 to 0·2 Gm.**).

Patent 18478/1897 now ***expired.*** Three methods of making are given in the specification. (1) deals with the precipitation of Protalbumose 4·4 with Silver Nitrate 1, in 1½ of water and the subsequent heating on a water bath of the washed moist precipitate with a warm solution of Deuteroalbuminose 5, in water 4½. The precipitate dissolves and the soluble Silver Proteinate is obtained by evaporating under reduced pressure. (2) Peptone and Silver Oxide are used, and in (3) Peptone and Silver Nitrate.

Characters.—A protein compound, containing 8% of silver, very soluble in water. *Decomposes* with heat.

Solutions ¼ to 1% (or stronger up to 10 and 40%) for ophthalmic use, and from 4 to 20% for wounds and ulcers, are prepared by rubbing the powder into a paste with water and diluting as required with cold or lukewarm (not hot) water. Stains the conjunctiva to some extent. Ointments 5 to 10%. It is alkaline to litmus and precipitates Cocaine Hydrochloride, but 10% found compatible with the Nitrate (2%). P.J. i./32,282; also with 1% Atropine Sulphate.—*ibid.*

Gonorrhœa well treated with ½ to 10% solutions, injections to be made every half-hour and retained five to ten minutes.—M.P.C. ii./11,559.

Bactericidal Power of the Various Silver Preparations.—*The organic silver preparations are far less penetrating and active than silver nitrate.* *See Vol. II.*

Ophthalmic Use.—A collyrium containing half a grain of sulphate of zinc and 10 grains of boric acid is more cleanly, certain and promptly efficacious than the silver compounds.—S. Theobald, L. ii./11,1570.

Liquor Protargol R.O.H.

Protargol 40, 60, 120, or 160 grains, Sterile Water to 1 ounce.

Sterules Ophthalmic of 10 and 25% solutions are prepared.

Collapsible Tubes of Silver Proteinate Ointment in paraffin basis, 2% and stronger as required, with catheter attachment are prepared for urethral medication in gonorrhea.

'Capsungs' of Protargol Ointment contain 2 Gm. of 2% Ointment in Soft Paraffin.

Protargol Jelly. *Syn.* **Schindler's Jelly.**

Solve with slight heat Agar 1 in Distilled Water 200, when cold incorporate Protargol 1.

In treatment of gonorrhœa the Agar has the effect of holding the Protargol in contact with the urethral wall. It must not be used too early before the acute stage has well subsided as it may prove irritating—nor should it remain in the urethra too long.—L. W. Harrison and C. H. H. Harold, R.A.M.C. Jl., Oct., 1912.

Vide also Manual of Venereal Diseases by Sir Alfred Keogh, Brevet-Col. C. H. Melville, Brevet-Col. Sir William Leishman, and Major C. E. Pollock. Second Edition, 1916.

Leistikow's Bougies have a basis of starch, sugar, dextrin and a little glycerin. A silver salt (*e.g.*, Silver Proteinate ½ grain for each), is added and the mass is rolled into bougies. Before being used they are dipped in hot water, which makes the outside smooth and slippery. When left in the urethra they slowly dissolve.—*ex ibid.*

Neisser's Bougies. Silver Proteinate 1%, Antipyrin 2% in Cacao Butter or Glycogelatin basis. 4 inches long. For the treatment of gonorrhœa.

Silver Gelatose. P.G. VI. (15% Ag.), P. Svec. X. (16%). *Syn.* ✱Albargine (T.M. 258119); Patent 23,507/1900, expired 1914.

According to the patent specification, Gelatose (produced by hydrolysis of glutin, etc., by acid or alkali) 10 Gm., is dissolved in water 10 Cc. and mixed after neutralising with Silver Nitrate 1·5 Gm. in water 5 Cc. The mixture is evaporated to dryness *in vacuo*. The salt thus obtained is a yellow white powder soluble to the extent of 50% in water.

Preparation.—For some details of procedure, *vide* Edn. XVIII., p. 189.

Characters and Uses.—A non-irritant compound containing 15% silver, of sand-like appearance. Soluble in water (about 1 in 2), and in alcohol 90% about 1 in 130. For gonorrhœa a 0·2% solution injected four or five times daily. 0·5 to 3% for ophthalmic use.

Incompatible with Chlorides and Tannin.

Stains on fabric may be removed with hot Sodium Thiosulphate solution 1 in 10.

Silver Gelatose Enema.

Dose.—1 pint increased to 1½ pints of strength 1 grain in 1 ounce on successive days.

Chronic Bacillary Dysentery Treatment.—Medicines *per os* cannot well reach the parts affected,—except, perhaps, large doses of Bismuth which might help to coat and protect ulcers. **Medicated Enemata** advised.—

Silver Nitrate killed the Dysentery Bacillus in 5 minutes up to a dilution of 1 in 10,000, yet in the presence of a little broth (*i.e.*, albuminous substances) it failed to kill in a dilution of 1 in 100 and 1 in 500—being at once precipitated by the broth. Albargin gave best results in broth, killing the Shiga Bacillus in 5 minutes up to dilutions of 1 in 500 and 1 in 1,000. Collargol, Ichthargan and Argyrol were inert in presence of broth, as also Copper Sulphate and Cuprol (Copper Nucleinate). Cyllin was active up to 1 in 2,500 and Iodine 1 in 1,000, as also Izal.

In bacillary cases the Silver Gelatose Injection is of great value—not in amœbic cases (for these *vide* Emetine).—L. Rogers, B.M.J. ii./13,1199.

Gonorrhœa treated by irrigation with 1 in 4,000 Albargin solution.—D. Lees, B.M.J. ii./21,480.

✱**Targesin** (T.M. 469190).

A Di-acetyltannin Silver Albumen combination in scale form. *Dose.*—1 to 5% aqueous solutions for irrigation in gonorrhœal infections in the male and 6 to 10% in the female. 5% ointment issued for inflammatory eye affections, and for ulcers, and skin affections.

Silver and other Hair Dyes.—See Vol. II.

ℙ1 ARSENIUM.

As=74·93.

ℙ1 *'Arsenic and its Preparations.'*

(Except for Agricultural, etc., purposes, see Schedule of Poisons.)

Applicable to Irish Free State : ℙ1 *'Arsenic and its preparations.'*

ℙ1 *Applicable to Northern Ireland : as Great Britain, except the* 1925 *and* 1926 *alterations to the British Schedule.*

Agricultural and Horticultural Poisons.

According to the Poisons & Pharmacy Act, 1908, *Poisonous Substances, i.e., those containing Arsenic, Tobacco, or the Alkaloids of*

Tobacco (i.e., Nicotine in particular), used exclusively for the above purposes for destroying insects, fungi, or bacteria, or as sheep dip or weed killers, may be sold in Great Britain and Ireland by Pharmaceutical Chemists, Chemists and Druggists, and Registered Druggists and by persons licensed by local authorities *who conform to the Regulations of the Privy Council as to storage, transport, etc., providing the provisions of the Pharmacy Acts and those appertaining to the Arsenic Act in the case of Arsenical Preparations are complied with.*

See also Agricultural and Horticultural Poisons at end of the book.

℞ **Acidum Arseniosum.** $As_2O_3 = 197{\cdot}86$. *Syn.* Arsenic; White Arsenic, Arsenious Anhydride, Arsenious Acid, Arseni Trioxidum U.S.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Maximum single dose $\frac{1}{120}$ grain (**0·005 Gm.**); maximum daily dose $\frac{1}{4}$ grain (**0·016 Gm.**). Possible fatal dose—2 grains.

Made by roasting arsenical ores, occurs in white lumps or powder.

Soluble about 1 in 60 of water. This solution is practically neutral, at any rate is compatible with both acids and alkalis. The solubility in weak Hydrochloric Acid solution is about the same. More soluble in Alkaline hydroxide and carbonate solutions. According to our experiments it is very soluble in Glycerin, at least 1 in 7—*cf.* Antimony Oxide. Physical characters of specimens, however, vary considerably.

Incompatible with Iron Salts, Lime Water, and Magnesia.

Uses.—It is given internally immediately after meals as a general tonic and nerve tonic, as for chorea, in diabetes and anæmia, as antiperiodic for malaria, for chronic skin diseases, and in association with iron, which it appears to render more easily assimilated. Latterly its efficacy in all forms of skin affections has been doubted. Small doses of Antimony it is stated may succeed when arsenic fails—especially in lichen planus. It is said to increase respiratory power (Styrian mountaineers add it to their diet) and to improve the complexion. All preparations of arsenic should be given after food. Externally it has a caustic action, and is put into the cavities of carious teeth to kill the nerves.

Rheumatoid arthritis is treated by Arsenic, but its action is slow and it must be given for weeks or even months.

In certain types of nervous vomiting in childhood, in obstinate cases, small doses of Arsenic and Opium, just before meals, are often immediately efficacious.

In tuberculosis may be of use. Arsenic interferes with carbohydrate metabolism, so that after the exhibition of small medicinal doses fat is laid on, especially in the subcutaneous regions. Arsenic also has a favourable influence on growth.—Dixon, Pr. 1913, 1.

For ***further uses*** see Liquor Arsenicalis and Liquor Arsenici Hydrochloricus.

℞ **Pills and Tablets of Arsenious Acid** contain $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ and $\frac{1}{20}$ grain. P. Jap. IV. Pills contain **0·001 Gm.** ($\frac{1}{60}$ grain).

Toxicology. An interesting résumé in a paper on "The Relationship of Medicine and Toxicology" of numerous *causes celebres* in which Arsenic and Antimony have been found. In one instance Arsenic, given apparently for poisoning, was found in the hair to the extent of 1/22 mgr. in 3 Gm. of hair.—Sir William Willcox, L. i./23,167.

In criminal cases of Arsenical poisoning the symptoms may be those of acute Arsenical poisoning, such as one would expect from a single dose, masked by those of prolonged action of Arsenic. Thus, symptoms of Arsenical neuritis or renal or liver disease may be superimposed upon those of the acute gastro-intestinal symptoms.—Sir William Willcox, B.M.J. ii./22,118 and L. ii./22,129, 139. *See Vol. II. for a further abstract of this paper.*

Arsenic can be found months or years after taking, in the nails and hair.—Sir W. Willcox, M.P.C., Nov. 12,'30.

Stoke-on-Trent Arsenic in sweets trouble. No deaths, probably because of the large amount, 77 to 150 grains of Arsenic in the lb. of sweets. It was used as dusting powder and got into treacle and was originally bought by colour manufacturers, who left it on the premises where the sweets were made.—B.M.J. ii./30,492. M.O.H. on the ease of obtaining large quantities of Arsenic by colour merchants, and leaving it about after vacating works.—P.J. ii./30,305.

Arsenic Eating, Arsenical Fly Papers, Weed Killers, Arsenical Wood Preservatives, Detection of Arsenic in Drugs, Organs of the Body, etc., and Various Arsenic Tests, see Vol. II.

Arsenic in Pharmacy and Chemistry. Occurrence, Metal, Compounds (weed-killers, etc.), Veterinary, etc., preparations.—G. Malcolm Dyson, P.J. i./29,72. Arsenic in the Middle Ages, Detection.—*Ibid.*, 147. Organic compounds.—*Ibid.*, 225.

Antidotes.

Stomach tube and emetics, olive oil, calcined magnesia in large quantity, mucilaginous drinks, stimulants and especially—

Antidotum Arsenici, Antidote to Arsenic. P. Dan. U.S. X. (Ferri Hydroxidum cum Magnesii Oxido.) P. Helv., F.E. VIII. and P. Jap. use Ferric Sulphate, and in other pharmacopœias.

Ferric Chloride 3 (or Strong Solution of Ferric Chloride B.P. '98,3), Water 17. When required for use add this solution to Calcined Magnesia 1, previously mixed with Water 19, and shake well. Should be freshly prepared, and given in doses of a tablespoonful every 5 or 10 minutes, until the symptoms are relieved. Ferric Hydrate should be administered in at least 12 times the quantity of the Arsenic supposed to have been swallowed. The Antidote contains about 2½% of the hydrate.

The diluted Ferric Solution and the mixture of Magnesium Oxide should be kept ready in separate bottles for immediate use.

The following is more expeditious in emergency. *Dilute Tincture of Ferric Chloride ½ ounce with half tumbler of water; add ½ ounce of strong solution of Sodium Carbonate.*

This antidote is stated to only delay the average time of death.—H. McGuigan, H. V. Atkinson and G. A. Brough, Jl. Am. Ph. A., per P.J. i./23,483. *Or give Liquor Ferri Dialysatus.*

Sodium Hyposulphite.—Arsenical poisoning due to drinking cider from a barrel which had previously contained Arsenic. Sodium Hyposulphite was given by the mouth in 2 Gm. doses, being repeated every time the patients vomited, and from the eighth to the fourteenth day all the patients (28) were given 20 grains daily. The most severe cases (13 died) were given daily intravenous injections of 7½ grains. No immediate improvement was observed following the use of the drug. To be of possible value in acute poisoning it should be ***given at once and in maximum doses.***—G. B. Lawson and co-workers, Jl. A.M.A. ii./25,26. *See also Sodii Hyposulphis.*

Sodium Hydrosulphite (*q.v.*) has been advised on basis of animal experiments (dogs). 0·1 Gm. per kilo followed by 25 Cc. N. Hydrochloric Acid, in a half-tumbler of water, and subsequently lavage.

℞ **Liquor Arsenicalis, Fowler's Solution** (*B.P.* '14). Fr. Cx., P.G. VI., P. Jap., P. Belg. IV., F.E. VIII. *Syn.* Liquor Potassii Arsenitis, U.S. X.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride.—F.I.

Fr. Cx.—*Max. dose* during 24 hours, 25 minims approx.

P. Off.—The Arsenic is dissolved in excess of Caustic Potash and neutralised with Dilute Hydrochloric Acid. Strength to remain 1%. According to the proposed form it would appear that approx. 10% of the Arsenic is present as Metarsenite ($KAsO_2$) and the rest free. Omit Compound Tincture of Lavender. The preparation is colourless.

Liquor Arsenicalis Neutralis Austr. and N.Z. Ph. Form (1%).

Heat Arsenious Anhydride 87·5 grains with Glycerin 2 ounces, to 150° C. to dissolve. Cool and add Water 17 ozs., then Tinct, Lavand. Co. 288 minims, and finally Water *q.s.* to 1 pint. P.J. ii./30,620.—Suggested previously by H. Finnemore, see *ibid.* i./31,535. (The idea is interesting—*cf.* the author's Glycerinum Antimonii Oxidi.)

Incompatible with Liquor Strychninæ Hydrochloridi. Employ Liquor Arsenici Hydrochloricus. Poisoning has occurred.

Exophthalmic Goitre.—Arsenic is a routine treatment, 5 minim doses of Liquor Arsenicalis thrice daily, except during one week in each month, or during the menstrual period, for 6, 8 or even 12 months. May be combined with Bromide, *e.g.*, 3 minims with 10 grains *t.d.* Tincture of Convallaria is recommended if pulse rate be over 110.

Pernicious Anæmia.—Arsenic is often given, but it has probably no real value. There is no specific remedy.—P. N. Panton and co-workers, L. i./23,277. *cf.* the **Liver Diet.**

In Hodgkin's Disease, arsenic should be pushed to the farthest limit short of toxic effects.—Whitla, Pract. Med.

Asthma treated by 5 minim doses with breakfast and dinner in conjunction with an alkaline Stramonium mixture.—P.J. ii./10,694.

Anæmic Vomiting.—2 minims of Fowler's Solution thrice daily found of great value—to this may be added at once or in the course of a few days 10 grains of Citrate of Iron and Ammonia. Bismuth and Alkalis of little value.—A. P. Beddard, Pr., March, 1912,359.

Herpes Zoster relieved by Arsenic—15 drops of Fowler's solution daily being taken for some time.—H. Carlill, B.M.J. ii./17,9.

Arsenical Keratosis followed by Cancer.—Patient had a more or less general psoriasis, which was controlled by arsenic for 7 years. Warty growths appeared on palms and soles, and the arsenic was stopped. 14 years after cessation of the drug the hyperkeratosis on palms and soles was as obvious as ever, and a tumour, necessitating amputation, developed.—H. C. Semon, B.M.J. ii./22,975.

Skin Papilloma well treated by swabbing thrice daily with the *B.P.* solution.—Per Jl. A.M.A. i./26,654. *We recommend great caution.*

℞ **Liquor Arsenici Hydrochloricus** (*B.P.* '14). **U.S. X.**

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride. Is compatible with acid mixtures.

In making this by the *B.P.* '14 directions use the entire litre of water with the Hydrochloric Acid instead of half that quantity. Solution is more easily effected.

℞ **Tablets of Arsenious Acid and Mercuric Chloride** 1/64 grain (**0·001 Gm.**) of each.

In exophthalmic goitre have been given thrice daily.

℞ **Mistura Arsenii Quininæ et Ferri**—*Syn.* Baccelli's Mixture (slightly modified).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Dissolve Quinine Sulphate 3 in Water 150 with aid of a little Dilute

Sulphuric Acid. Then dissolve Green Ammonio-Citrate of Iron 5 in Water 150, mix and add Fowler's Solution 3. Employed in malaria.

Mistura Antimalarica (Baccelli). **P. Ital. V.** *Dose.*—½ to 1 ounce **(15 to 30 Cc.).**

Quinine Sulphate 3 Gm., Iron and Potassium Tartrate 7·5 Gm., Distilled Water 300 Gm., Fowler's Solution 25 drops.

ℙ1 **Sodii Arsenis.** *Syn.* SODIUM METARSENITE. $NaAsO_2$=129·927.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain **(0·001 to 0·004 Gm.).**

A whitish powder soluble in water, slightly in alcohol. Has properties equivalent to Arsenious Acid.

ℙ1 **Arsenii Bromidum.** $AsBr_3$=314·678.

Dose.—$\frac{1}{60}$ to $\frac{1}{12}$ **(0·001 to 0·005 Gm.).**

In yellowish white deliquescent crystals, soluble in water. Is recommended for diabetes and epilepsy.

ℙ1 **Liquor Arsenici Bromatus.** *Syn.* LIQUOR POTASSII ARSENATIS ET BROMIDI. CLEMENS' SOLUTION.

Dose.—1 to 5 minims **(0·06 to 0·3 Cc.)**, once or twice a day.

Potassium Carbonate 1, Arsenious Anhydride in powder 1, Distilled Water 80. Boil until dissolved. When cooled, add Bromine (by weight) 2, and Distilled Water, *q.s.* to 100. Heat until decolourised. The solution is useful in epilepsy and diabetes with careful diet.

Contains approximately 1·5% Arsenic Acid, 0·5 to 0·6% Hydrobromic Acid, and 1·6 to 1·7% Potassium Bromide.

ℙ1 **Granula Dioscoridis.** (P. Dan. and FR. CX.).

Contains 1 milligramme Arsenious Anhydride. *Dose.*—1 to 5.

ℙ1 **Pilula Arsenicalis et Strychninæ** contains $\frac{1}{30}$ grain **(0·0013 Gm.)** of each.

ℙ1 **Pilula Asiatica.** *Dose.*—1 or 2 daily.

Arsenious Anhydride, $\frac{1}{12}$ grain **(0·005 Gm.)**, Black Pepper ¾ grain **(0·05 Gm.)**, Gum Acacia *q.s.* In chronic skin affections.

In psoriasis this is a convenient method of giving arsenic.

P.G. VI. contains 1/64 grain **(0·001 Gm.)** Arsenious Acid, and ½ grain **(0·03 Gm.)** of Pepper.

ℙ1 **Pilula Ferri Arsenicalis.** *Dose.*—1 thrice daily.

Arsenious Anhydride, in fine powder $\frac{1}{60}$, Exsiccated Ferrous Sulphate 3, Syrup ½; in grains, for one pill; in grammes, for fifteen.

In chlorosis and anæmia most efficacious.

ℙ1 **Pilula Ferri Arsenicalis cum Strychnina** is the same with Strychnine Hydrochloride $\frac{1}{60}$ grain.

ℙ1 **Pilula Acidi Arseniosi et Ferri Redacti.**—MONCKTON.

Dose.—1 to 3 grains. Arsenious Anhydride, 12 grains. Reduced Iron 1 ounce. Excipient *q.s.* Mix.

ℙ1 **Tablets,** of Arsenious Acid $\frac{1}{64}$ grain and Blaud's Pill 4 grains.

Dose.—1 to 4.

ℙ1 **Tablets of Arsenic, Iron and Quinine** contain Arsenious Acid $\frac{1}{60}$ grain, Ferric Hypophosphite 2 grains, Quinine Acid Sulphate 1 grain.

ℙ ℙ1 **Pasta Arsenicalis.**—*Martindale.* For dental caries to destroy the nerve.

Arsenious Anhydride, levigated, 24, Plaster of Paris 32, Morphine Sulphate 16, Cocaine 4. Mix and add Clove Oil 4, Phenol 20.

R.D.H. has Arsenious Acid 2, Morphine Acetate 1, Creosote *q.s.* to form a paste. *These two preparations are very poisonous.*

The equivalent of about $\frac{1}{10}$ grain of Arsenious Acid is sufficient.

Apply as follows:—Remove as much carious tissue as possible, exclude moisture and disinfect. Apply the paste as near pulp as possible and protect by concave cap. Seal cavity carefully with Mastiche in Chloroform.

℞ ℙ1 **Dental Arsenical Fibre.** *Syn.* **Arsenious Wool. Gossypium Arseniosum, R.D.H.** Arsenious Acid 5, Tannin 2, Morphine Acetate 10, Carbolic Acid liquefied *q.s.* to make a thin paste. Mix with a sufficiency of finely cut cotton wool. Contains in the finished condition, Arsenious Acid 24·17%, Morphine Acetate 48·3%, Carbolic Acid 16·7%.

Used in the same way as Pasta Arsenicalis. Some formulæ contain creosote *vice* carbolic acid.

ℙ1 **Arsenii Iodidum.** (*B.P.* '14). **U.S.** As I_3=455·726.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (**0·003 to 0·012 Gm.**), in a pill.

Soluble, forming a slightly cloudy acid solution in water 1 in 11, in alcohol 90% 1 in 40.

The two elements combine forming orange-coloured crystals. It should be recrystallised so as to exclude a melted mixture of Arsenium and Iodine, or Arsenium powdered 10, may be mixed with Iodine 51 in presence of water, digested at gentle heat and evaporated to dryness.

Solution 1% in 1 to 10 drop doses in milk, useful for lymphatic and scrofulous children, has marked iodine effect. Also used externally.

In diseases of the alimentary canal, especially gastritis, in phthisis, and in all cases of neuritis it is of great use. In epilepsy by gradually adding arsenic to the bromide mixture, the dose of the bromide may be lessened and will finally keep the fits under alone. Useful also in helping to clear up a pneumonic lung and in promoting absorption of pleuritic effusion.—L. i./11, 1210.

The content of AsI_3 may be estimated by titrating a weighed quantity in an aqueous Sodium Bicarbonate Solution with decinormal Iodine Solution.

ℙ1 **Injectio Arsenii Iodidi Hypodermica.**

Dose.—$\frac{1}{100}$ grain (**0·0006 Gm.**) in 6 minims (**0·4 Cc.**) of sterile water. The strength may be increased if desired.

ℙ1 **Sterules, Hypodermic,** contain 1/100 grain.

ℙ1 **Liquor Arsenii et Hydrargyri Iodidi** (*B.P.* '14). P. Jap. III, (now omitted). *Syn.* DONOVAN'S SOLUTION.

Contains Arsenious Iodide and Mercuric Iodide, of each 1%, or 87½ grains of each in Distilled Water *q.s.* to 20 ounces. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**). (U.S. X. has smaller average, 1½ minims.)

Given for syphilitic skin diseases.

Incompatible with potassium iodide and Sal Volatile (*cf.* Nessler's reagent): also with alkaloids and acids.

Should be *freshly prepared* or stored in small bottles completely filled. A sample after 14 months was found to contain no Arsenious Arsenic.—T. Tusting Cocking, Qtrly. Jl. Ph., '29,409.

See also ℙ1 **Pilula Arsenii et Hydrargyri Iodidi.**

℞ **Injectio Sodii Arsenitis et Ferri.**

This 'ARSENIC AND IRON INJECTION' is largely employed in two strengths in anæmic conditions :—

"*No.* 1 *grade (weak).*" Hypodermic dose 1 Cc.=0·025 Gm. 'Soluble Iron Arsenite,' equivalent to $\frac{1}{2}$ milligram of Arsenious Acid, and the other.

"*No.* 2 *grade*" (*double strength*) 1 Cc.= 1 mgr. of Arsenious Acid.

Injections may be made (as deeply as possible) with advantage at 1 to 2 days interval, and commencing for the first few doses with $\frac{1}{4}$ to $\frac{1}{2}$ Cc. only of the No. 1 when the stomach is empty. Intramuscular (gluteal) injections may be better tolerated, *but the injections are as a rule not painful.* The course of the treatment extends over 1 to 2 months.

℞ **Sterules** of **Arsenic and Iron** are prepared of each of the above. *Dose.*—15 minims (**1 Cc.**) hypodermically.

Physicians should specify which strength is required.

PERNICIOUS ANÆMIA.—The injection intramuscularly appears to be of value : 1/3 grain in 1 Cc. on alternate days for 12 doses would be a suitable course.—Sir W. H. Willcox, L. ii./27,778.

ALOPECIA.—A five weeks' course of Iron and Arsenic injections gave benefit.

℞ **Guttæ Sodii Arsenitis et Ferri.**—"IRON AND ARSENIC DROPS." *Dose.*—5 drops (or minims) containing $\frac{3}{4}$ grain (**0·05 Gm.**) of 'Soluble Iron Arsenite' equivalent to $\frac{1}{64}$ grain (**0·001 Gm.**) of Arsenious Acid—(*cf. antea*) *per os.*

A gradual increased dose up to 20 drops is recommended.

℞ **Potassii Arsenis.**—*Dose.*—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**).

The dry salt $KAsO_2+HAsO_2+H_2O=271·9834$, containing about 73% As_2O_3 made from arsenious acid and potassium bicarbonate.

Used occasionally in place of arsenious anhydride.

℞ **Cupri Arsenis.** $Cu_3As_2O_6=436·57$. **Scheele's Green.**

Dose.—1/100 to 1/25 grain (**0·0006 to 0·0025 Gm.**).

Amorphous green powder, used in various intestinal affections, cholera morbus, cholera infantum, diarrhœa, dysentery and typhoid. Dose for adults $\frac{1}{500}$ to $\frac{1}{3000}$ grain every 10 minutes for an hour, then hourly ; for children, half this quantity. Small repeated doses essential. For chlorosis and functional anæmia, $\frac{1}{50}$ to $\frac{1}{25}$ grain thrice daily are given.

℞ **Acidum Arsenicum.**—*Syn.* **Ortho-Arsenic Acid.**

$H_3AsO_4.\frac{1}{2}H_2O=150·9618$.

Dose.—$\frac{1}{64}$ to $\frac{1}{12}$ grain (**0·001 to 0·005 Gm.**). A crystalline powder soluble about 2 in 1 of water, and very in Alcohol 90%. Arsenites are said to be twice as active as arsenates. The following salts are in use :—

℞ **Ferri Arsenas** (*B.P.* '98). *Dose.*—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**).

This is an amorphous greenish powder and consists of Ferrous Arsenate, $Fe_3(AsO_4)_2,6H_2O=553·4736$ (not less than 10%) with Ferric Arsenate $Fe_2(AsO_2)_2=389·54$, and Iron Oxide. The Ferrous Arsenate rapidly oxidises in the air. In chronic skin affections of all kinds. TABLETS contain $\frac{1}{8}$ grain (**0·008 Gm.**).

The FR. CX. preparation (method given) has formula $(AsO_4)_2Fe_3+3H_2O$—Ferrous Arsenate—with a little Ferric salt. To be kept

n bottles sealed down with fat. *Maximum single dose* $\frac{3}{4}$ grain; naximum during 24 hours $2\frac{1}{4}$ grains approximately. F.E. VIII. *Max. single dose*, 1/12 grain, during a day $\frac{1}{2}$ grain.

℞ **Sodii Arsenas Anhydrosus** (*B.P.* '14). Na_2HAsO_4=185·9318.

Dose.—$\frac{1}{40}$ to $\frac{1}{10}$ grain (**0·0015 to 0·006 Gm.**).

Sodium Arsenate crystallises with either 7 [$Na_2HAsO_4,7H_2O$= 12·047], **Fr. Cx., Ph. Ned. V., P. Belg. IV.**, or 12 molecules M.W.=402·1392] of water. The anhydrous salt, in white powder, ried at 150° C., contains 61·8% of As_2O_5, and is soluble 1 in 3 of water t 25° C. 1 of the anhydrous salt equals 1·68 of the salt with $7H_2O$. F.I. and P. Ital. V., require the salt crystallised with $7H_2O$ and ontaining 36·85% of arsenic acid as in many Pharmacopœias.

Soluble 1 in 5 of water. Slightly soluble in alcohol.

Fr. Cx. (*vide* above) has *max. single dose* $\frac{1}{6}$ grain. *Max. during* 24 *ours*, $\frac{1}{3}$ grain approximately.

Ulcerative endocarditis. Influence of Arsenic (as Sodium Salt) dvised.—J. Lycett, B.M.J. ii./22,402.

Deafness. Sodium Arsenate has been found beneficial, $\frac{1}{12}$ grain n pill followed by $\frac{1}{6}$ grain the next day—altogether 40 to 60 pills n as many days.—per P.J. ii./26,287.

℞ **Pilula Sodii Arsenatis,** $\frac{1}{32}$ and $\frac{1}{64}$ grain.

℞ **Injectio Sodii Arsenatis et Strychninæ.**

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) hypodermically. Sodium Arsenate 2 ($\frac{1}{30}$ grain in 10 minims), Strychnine Hydrochloride 1 ($\frac{1}{60}$ rain in 10 minims), Water to 600.

℞ **Sterules, Hypodermic,** contain 10 minims of above.

℞ **Injectio Sodii Arsenatis et Strychninæ et Quininæ** contains grain Quinine Acid Hydrochloride added to 10 minims of the above.

℞ **Sterules, Hypodermic,** contain 10 minims.

℞ **Liquor Sodii Arsenatis** (*B.P.* '14).

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). 1% of Exsiccated Salt.

℞ **Pearson's Solution of Arsenic** used on the Continent, *e.g.*, P. Ital. V. is 1 of crystallised Sodium Arsenate ($7H_2O$) in Water 600, P. Belg. IV. is 1 in 1,000.

℞ **Arsenical Cigarettes** are made of paper impregnated with sodium arsenate, so that each contains $\frac{3}{4}$ grain (**0·05 Gm.**) of the salt. The patient ought to inspire the fumes deeply three or four times.

℞ **Tablettæ Sodii Arsenatis Compositæ.**

Anhydrous Sodium Arsenate $\frac{1}{20}$ grain, Lupulin 3 grains.

A digestive tonic combination.

℞ ORGANIC ARSENIC COMPOUNDS.

For the pioneer work on Chemotherapy readers are referred to the earlier editions of the book.

An organic Arsenic compound, as distinct from the inorganic orm, has the Arsenic in combination with a Carbon atom. This ppears to lessen its toxic properties. Furthermore, Arsenium acts

either as a tri- or penta-valent element and, broadly, the former compounds are more potent upon protozoa. Examples of the first class are Arsenobenzol and of the second, Sodium Cacodylate, Sodium Arsanilate, Tryparsamide, etc. We prefer to classify the compounds under the headings (i) *Aliphatic*, (ii) *Aromatic*, (iii) *Diphenyl nucleus* bodies, as far as practicable.

The dose of Organic Arsenic compounds should not be 'pushed.' Signs of disturbance of vision should be looked for.

The following terms are used :—

Arsinic Acid constitutes a dialkyl or diaryl derivative of arsenic acid—*i.e.*, cacodylic acid—and homologues, *e.g.*, phenyl-arsinic acid, $(C_6H_5)_2AsO.OH$.

Arsenic Acid indicates arsenic acid, $AsO.(OH)_3$, in which one of the hydroxyls is replaced by an organic radicle. An *arsonate* is a salt of this acid. French and German chemists do not as a rule make these distinctions.

Arylarsonate.—This term indicates an aromatic arsonate. Aryl indicates, *e.g.*, phenyl, tolyl, xylyl, or naphthyl, as applied to substituted hydroxyl in arsenic acid.

Arsenoic.—In French literature refers to aromatic arsenic bodies containing two atoms of arsenic believed to be coupled together by a double linkage—*e.g.*, $C_6H_5-As=As-C_6H_5$, arsenobenzene, comparable with $C_6H_5-N=N-C_6H_5$. azobenzene.

(I). *Aliphatic (or Fatty) Series.*

℞ **Acidum Cacodylicum.** **Dimethylarsinic Acid**

$(CH_3)_2AsO.OH=137{\cdot}9846$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

The ultimate product of oxidation of Arsenium-dimethyl (Cacodyle). *Syn.*—Tetramethyl Diarsine $(CH_3)_2As—As(CH_3)_2$, discovered by Bunsen in 1842, and of Cacodyle Oxide, *Syn.* Alkarsin, $(CH_3)_4As_2O=225{\cdot}9536$. Colourless crystals neutral to Methyl Orange. ***Soluble*** about 2 in 1 of water, 1 in 4 of alcohol 90%, readily in chloroform, and although containing 54·3% arsenium, equivalent to 71·6% arsenious acid, it is relatively non-toxic—similarly with the Salts. It will be noted that this acid has only 1 OH group, hence it is not so toxic as its parent arsenic acid, with 3 OH.

Sodium Cacodylate and Arrhenal are probably broken down in the body to such slight extent that large doses may be given without producing any therapeutic, much less toxic, effect. They appear, principally in the urine, unaltered. A small proportion is, however, oxidised and from this arsenic Ions are set free, exerting a mild action during a prolonged treatment.

℞ **Calcii Cacodylas** $[(CH_3)_2AsO_2]_2Ca=314{\cdot}0236$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or intramuscularly.

A white amorphous powder. ***Soluble*** 2 in 1 of water, 1 in 2 of alcohol. In tuberculosis daily injections of ½ grain with a glycerin Solution of Calcium Iodide 10 grains and Ferrous Iodide 1½ grains per drachm internally have been found satisfactory.

℞ **Ferri Cacodylas.** $[(CH_3)_2AsO_2]_3Fe=466{\cdot}7704$.

Dose.—¾ to 5 grains (**0·05 to 0·3 Gm.**) *per os* per diem, or ½ to 1½ grains (**0·03 to 0·1 Gm.**) hypodermically per diem. *Intravenously* 1 grain (**0·06 Gm.**) in 5 Cc.

Manufacture.—Precipitate the Ferric Hydroxide from a sufficiency of Ferric Chloride solution containing 1 molecular proportion of Ferric Chloride ($Fe_2Cl_6 + Aq.$). Wash the precipitate and combine with Cacodylic Acid 6 molecular proportions, or precipitate Barium Cacodylate with Ferric Sulphate solution in molecular proportions.

Yellowish powder soluble 1 in 15 of water, used for anæmia and chlorosis, also in glandular swellings, *e.g.*, in syphilis, hypodermically.

Iron Cacodylate ½ grain intravenously every other day used for raising the hæmoglobin content.—H. Pritchard, B.M.J. i./27,794.

℞ **Guaiacol Cacodylas.** $(CH_3)_2.AsO.O.C_6H_4(OCH_3).H_2O = 262{\cdot}047$.

Syn. CACODYLIACOL.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or hypodermically in sterile oil in affected regions for tuberculosis. Soluble 1 in 25 water, 1 in 1·5 alcohol 90%.

℞ **Magnesii Cacodylas.** $[(CH_3)_2AsO_2]_2Mg, ?H_2O$.

Dose.—¾ grain (**0·05 Gm.**) hypodermically, gradually increased (5% solution suitable). White amorphous powder soluble 1 in 3 of water.

Uses, etc., as the Sodium Salt, *q.v.*

℞ **Sodii Cacodylas.** **P. Helv.** FR. Cx. and Supp. 1920, P.G. VI., U.S. X., P. Ital. V., F.E. VIII., P. Belg. IV. **Sodium Dimethylarsinate.** $(CH_3)_2AsO_2Na + 3H_2O = 214{\cdot}0206$.

Dose.—Average per rectum and hypodermically ½ to 1 grain (**0·03 to 0·06 Gm.**).

FR. CX. has *max. single dose* 3 grains and during 24 hours 3 grains approximately.

The salt of the above formula contains 35% Arsenium whilst the anhydrous salt contains 46·8%, equivalent to 61·8% arsenious acid. FR. CX. Supp. 1920 gave a formula $+2\frac{1}{2}H_2O$ (previously anhydrous) and states the official salt must contain 75 to 78% Anhydrous Sodium Cacodylate. (Not confirmed in Supp. Nouv. 1926). P. Ital. IV. requires it to contain 70%. In commerce it usually contains 18 to 25% of water. It should be carefully examined for inorganic arsenic, and, being a deliquescent salt, solutions should be standardised.

P.G. VI. requires a content of 32·8 to 35% Arsenium.

Soluble 2 in 1 water, in alcohol 1 in 1.

Uses.—In tuberculosis generally (curative results come very slowly), in diabetes mellitus, exophthalmic goitre, pernicious anæmia, cancer (particularly of the stomach), malaria, chorea, leprosy, psoriasis, and other chronic skin affections, and in all cases in which arsenic has been used, but when given by the mouth or per rectum may cause renal congestion with albuminuria and fall in the quantity of urine excreted.

As far back as 1862 Cacodylic acid was found to give excellent results in treatment of chronic skin diseases and in pulmonary tuberculosis. It was stated in 1865 (before Koch's discovery of the bacillus) to 'impart to the blood of the patient a condition inimical to the tuberculosis.'

Much later it was employed in syphilis and for the various other purposes for which Arsenic is indicated.

SYPHILIS.—The usual dose has been 1 to 2 grains *intramuscularly*

for a week or 10 days. Some proceed to a course of 3 grains for 7 days, with finally 1 grain doses daily subcutaneously. Intermitting the courses for a few days may be well. It seems to destroy the spirochetes. It possesses advantages over Arsenobenzol, and it is still considerably used in spite of this competitor.

Intravenously in sufficient quantity Sodium Cacodylate is better than Arsenobenzol. Dose never less than 10 grains and often as much as 30 grains repeating the dose in 4 days' time. No toxic symptoms.—W. H. Forster, Jl. Amer. Pharm. Assn., 1917, 6, 142 (P.J. i./17, 275.)

CHRONIC BRONCHO-SPIROCHÆTOSIS rapidly recovered under sodium cacodylate *per os*.—E. C. Faust, Jl. Trop. Med. Jan. 1/23,14.

ENDOCARDITIS treated by **Capps's Sodium Cacodylate Method**—daily intravenous injections beginning with 1 grain and increasing gradually to 5 grains. Free from ill effects.—Sir Thos. Horder, B.M.J. i./26,737.

PARALYSIS AGITANS has been treated by Sodium Cacodylate intravenously. The usual dosage for syphilis was employed, 1·5 Gm. increasing to 6·5 Gm. in 16 days, altogether 32 Gm.—Jl. Intrav. Therap., May '26.

SCLEROSIS, DISSEMINATED.—Good results with ¾ grain doses injected daily or every other day for 12—14 days. The patient was kept fit for 18 months with injections at 3-monthly intervals.

PERNICIOUS ANÆMIA.—Sodium Cacodylate ½ grain may be given hypodermically daily for 20 days.—Sir W. H. Willcox, L. ii./27,778.

MALARIA well treated by intravenous injections of 30 grains, divided into 4 doses of 7½ grains at 6 hour intervals, until parasites have disappeared from peripheral blood, when dose is halved and continued for a fortnight.—Jl. A.M.A. ii./26,124.

PEMPHIGUS of acute type responded dramatically to 2 grain doses. Total injected 50 grains during 5 weeks.—L. J. A. Loewenthal, B.M.J. i./30,153.

℗ **Elixir Sodii Cacodylatis** (Standardised).

Dose.—30 minims (equivalent to ½ grain of the salt).

This forms a palatable method of administering the salt.

℗ **Pills** contain ½ grain (**0·03 Gm.**).

The following formula in grains is useful :—

Sodium Cacodylate 50, Benzoin 50, Liquorice Powder 50, Acacia Powder 25, Alcohol 90% *q.s.* Divide into 100 pills. *Dose.*—1 three or four times a day.

℗ **Hypodermic and Intravenous Injection.** A sterile preparation is made and standardised to contain 0·05 Gm. (¾ grain) of Cacodylic Acid in 1 Cc. (15 minims approx.), a dose once in 24 hours. The same dose diluted with 4 drachms of water is used for **Rectal Injection.**

℗ **Sterules Hypodermic of Sodium Cacodylate** contain ½, ¾, 1, 1½ and 2 grains in 15 minims (**1 Cc.**).

℗ **Sterules of Sodium Cacodylate, 1 grain (0·06 Gm.), with Nucleinic Acid Solution 1 Cc.** (*see also Acidum Nucleinicum*).

SEPTICÆMIA.—Arsenic, *e.g.*, Sodium Cacodylate, intramuscularly may be placed first—given in conjunction with Nucleinic Acid, usually 1 grain of Sodium Cacodylate in a saturated solution of Nucleinic Acid, 1 Cc. intramuscularly being given twice in 24 hours for the first two or three weeks of an acute case. A good leucocyte stimulant. A convenient method of knowing that the patient is receiving an effective dose is the smell of his breath. Opium and specific vaccines.—Sir Thomas Horder, B.M.J. i./25,657 ii./31,593.

℗ **Injectio Cacodylatum Compositum.** *Dose.*—(average) 15 minims (1 Cc.), containing Sodium Cacodylate $\frac{3}{4}$ grain, Iron Cacodylate ; grain, Strychnine Cacodylate $\frac{1}{64}$ grain. It should, we find, be rendered slightly acid with Cacodylic Acid at the finish. 1 Cc. contains approx. 0·03 Gm. ($\frac{1}{2}$ grain) Arsenium.

Gautier recommends : ℗ Cacodylic Acid 5 Gm., Sodium Carbonate *q.s.*, Cocaine Hydrochloride 0·08 Gm., Creosote 6 drops, dissolved in Alcohol 8 Gm. with Sterile Water *q.s.* to 100 Cc., *i.e.*, 15 minims (1 Cc.) contain $\frac{3}{4}$ grain (**0·05 Gm.**) of Cacodylic Acid for a dose—hypodermically—which is not to exceed 0·1 Gm. ($1\frac{1}{2}$ grains) *pro die*, the average being 0·02 to 0·05 Gm. every 24 hours.

℗ **Solución de Cacodylato de Sodio Iodo-mercurico Esterilisado** Sodium Cacodylate 4, Mercuric Iodide 0·5, Sodium Iodide 0·5, Water to 100.

Dose.—Each Cc. contains 0·04 Gm. of sodium cacodylate and 0·005 Gm. of mercuric iodide.

℗ **Strychninæ Cacodylas.** $C_{21}H_{22}N_2O_2(CH_3)_2AsO.OH = 472·1722$.
Dose.—$\frac{1}{30}$ to $\frac{1}{10}$ grain (**0·002 to 0·006 Gm.**).

White crystalline powder hardly soluble in water, readily soluble in chloroform. Has proved a useful salt.

℗ **Di-sodium Methylarsenate.** *Syn.* Sodium Methyl Arsonate, Arrhenal, 'New Cacodyle', $CH_3.As{=}O(ONa)_2.5H_2O = 274·0254$. Fr. Cx., F.E. VIII., P. Belg. IV., P. Ital. V. ($6H_2O$).

Dose.—$\frac{2}{5}$ to 3 grains (**0·025 to 0·2 Gm.**) *per os* or hypodermically. Fr. Cx.—*Max. single* and during 24 hours *dose* 3 grains.

Prepared by the interaction of Methyl Iodide and Sodium Arsenate in presence of excess of Alkali.

Soluble about 1 in 1 of water, only slightly in alcohol 90%.

Arsenic content. (With 5 mols. H_2O) = 27·35%.

Uses.—Similar to Sodium Cacodylate *q.v.*

It is stated not to produce Cacodyle Oxide when given by the mouth.

℗ **Sterules, Hypodermic of Arrhenal,** $\frac{1}{3}$ grain (**0·02 Gm.**), and $\frac{3}{4}$ grain (**0·05 Gm.**).

℗ **Mercury Salicyl-Arsonate.** *Syn.* Enesol.

Dose.—$\frac{1}{4}$ to 1 grain (**0·015 to 0·06 Gm.**) intramuscularly.

Syphilis and parasyphilis are treated by 2 Cc. of 3% solution (=1 grain approx.) *intramuscularly* once daily, or for intensive treatment of syphilis 4 to 8 Cc. every 2 or 3 days. *Intravenously*, 4 to 10 Cc. every 2 or 3 days according to urgency.

When a total amount of 1·5 Gm. is reached, suspend treatment for 10 days.

A combination of Arrhenal and Mercury Salicylate. A white powder containing 36% mercury. It is best supplied in solution. This is said to be painless on injection.

General paralysis, malaria, and psoriasis, are also treated with it.

℗ **Sterules, Hypodermic, of Mercury Salicyl-Arsonate** are prepared, grain in 30 minims (3% approx.), for intramuscular injection.

A course of twenty 1 grain Enesol Injections would result in giving about 8 grains of mercury in 10 weeks.

(II.) *Aromatic Series.*

℗1 ***p*-Aminophenylarsonic Acid.** *Syn.* **Arsanilic acid. Aniline-arsenic acid.** $NH_2C_6H_4.AsO(OH_2)=217{\cdot}0024$.

Arsanilic Acid is weakly basic. Its Hydrochloride is immediately hydrolised by water. It is soluble, however, in methyl and ethyl alcohol. It has been employed as.

℗1 **Sodii *p*-Aminophenylarsonas.** *Syn.* ✱Arsamin, (T.M. 302016) ✱Atoxyl (T.M. 244636), ✱Soamin (T.M. 302133), Sodium Arsanilate. $NH_2C_6H_4AsO(OH)O.Na=238{\cdot}9896$.

Usually in commerce $+4H_2O=311{\cdot}052$, and containing about 24% As, P. Belg. IV., $3H_2O$.

Dose.—¾ to 3 grains (**0·05 to 0·2 Gm.**). This dosage *per os* for syphilis has been advised daily for a week, then to be intermitted, but caution is recommended. Max. single dose 3 grains (**0·2 Gm.**).

Intramuscular injections (into the buttock) have been given of much larger doses, even up to 10 grains at a time, in a total course of 100 grains, at several days' interval in treatment of syphilis, as a substitute for Mercurials. The upper third of the buttock is the usual site of injection.—*N.B. Not without danger.*—Avoid heroic doses.

Intravenously 1 to 5 minims (**0·06 to 0·3 Cc.**) of a 15% solution have been given, *i.e.* approx. ⅐ to ¾ grain, but larger doses have been used, and we should advise 1 Cc. at least of diluent.—*Cf.* Intrav. Dose Table.

Solutions should be freshly prepared with cold boiled water and may be slightly warmed at time of injection.

Manufacture.—It was originally prepared by Béchamp, *vide* Comptes Rend., 1863, Vol. 56, I., p. 1172, though the substance he obtained he thought to be Arsenic Anilide. By heating Arsenic Acid with an excess of Aniline the Arsenate is formed, this however, is transformed by prolonged heating at 190° C. into *p*-Aminophenylarsonic Acid. This attained, one neutralises with Sodium Carbonate, decomposes with Nitric Acid, collects the Acid, neutralises with Sodium Hydroxide, and evaporates to crystallise. Recrystallise from 90% Alcohol.

History of Organic Arsenic Compounds in treatment of protozoan diseases.—Benjamin Moore, B.M.J. i./16,617. See our Edn. XVIII., p. 202.

A white crystalline powder with slightly saline taste.

Soluble about 1 in 6 of water (some samples may dissolve in a little less). Also soluble about 1 in 125 of alcohol 90% and more so in Methyl Alcohol. The Anhydrous substance is readily soluble in Methyl Alcohol but practically insoluble in Ether, Acetone, Benzol, or Chloroform.

Incompatible with Mercurials (*e.g.*, Perchloride), and other heavy metals in solution, also with Acids.

Uses.—Large quantities of arsenic can be given by it in skin diseases (psoriasis, lichen), in anæmia, syphilis, sarcoma, elephantiasis, malaria, tuberculosis and trypanosomiasis. Syphilis has been treated with 50% Ointment used on chancre of the skin.

It is stated to have less than 1/40 the toxicity of Arsenious Acid.

℗1 **Pills of Arsamin** contain ½ grain and upwards. ℗1 **Elixir Arsamin** contains ½ grain in each drachm and may be prepared stronger if required. ℗1 **Sterules (Hypodermic) of Arsamin** ½ also ¾ grain in 15 minims (**1 Cc.**).

Purves Stewart has prescribed the Elixir considerably in cases of isseminated sclerosis and tabes without having witnessed bad effects rom the drug, but cases must be watched carefully.

℞ **Arsamin Paste.** 10% may, from our experiments, be prepared vith **Pigmentum Caseinæ**, *q.v.*

In syphilis this has been used to primary sores, with large injections of Atoxyl simultaneously into the buttock.

℞ **Tablets Arsamin** contain one grain. ℞ **Capsules Arsamin** and 2 grains, also ℞ **Capsules Arsamin** 1 grain with **Blaud Pill** grains and with **Quinine** 3 grains are prepared and are useful or treatment in cases where the added drugs suggest themselves.

For Methods of Testing Sodium Arsanilate for inorganic Arsenic, see Vol. II.

Sodium Arsanilate plus Mercury.—Combined have been used without much favour.—**Sodium Arsanilate plus Orpiment** (Arsenic Trisulphide $As_2S_3 = 246{\cdot}04$) were also largely given. The trypanosomes probably never become resistant to inorganic Arsenic.

Sodium Arsanilate plus Tartar Emetic was also tried.

Syphilis.—Though Atoxyl is a cure, it is no longer used, as it dissolves in the tissues of the eye and causes optic neuritis and atrophy.—W. E. Dixon, B.M.J. i./25,813.

Sodium Arsanilate plus Bismuth *v.* **Bismuth Arsanilate.**

Relapsing Fever. Large doses have been given, *e.g.*, doses of from 9 to 23 Cc. of 20% solution.

KALA-AZAR. Success has followed 3 grains every third day.

Trypanosomiasis.—Thomas of Liverpool first applied Atoxyl in trypanosomiasis. 2 Cc. of 20% solution repeated after 18 days. Immediate effect was magical, but it only helped the sufferers in dying. Koch thought it to be a specific.

The *para*-Acid acts promptly on trypanosomes, the *meta*- has less effect and the *ortho*-Acid no effect at all.—L. ii./12,1822. See also Fortescue Brickdale, B.M.J. ii./12,1489.

Ehrlich pointed out that a drug can only be of value in infectious diseases, if taken up more readily by the parasite—bacterio-tropous (*syn.* ætiotropous)—than by the organism—organotropous. Many protozoa take up dyes. **Trypan Red** is active against trypanosomes.

He advised the use of Atoxyl, Parafuchsin, Trypan Red and Trypan Blue. Combine a potent substance which will kill the bulk of the trypanosomes with a weaker one, which will account for the remainder, which would cause relapse. Mercuric Chloride is a useful adjuvant to Atoxyl.

Trypanblue $C_{34}H_{24}N_6O_{14}S_4Na_4 = 960{\cdot}4632$ successful in piroplasmosis, *biliary fever* or *malignant jaundice* of the dog (canine *piroplasmosis*) and *red water* or *Texas fever* of cattle (bovine piroplasmosis). It is stated to be a certain and immediate cure for distemper. *Dose.*—Dogs 2 months old, of 3 to 5 lbs. weight 3 Cc. to 4 Cc. of ½% Solution. From 10 lbs. to 60 lbs. weight, dose ranges from 3 to 20 Cc. of Saturated Solution (1% approx.). Subcutaneously, or in preference intravenously, into the vena saphena in the hind leg of a dog.

Cattle.—*Dose.*—100 to 200 Cc. of Saturated Solution.

Trypan Blue is a remedy for piroplasmosis in domestic animals, but no other success is recorded.—Dixon, p. 22. See also B.M.J. ii./22,410.

Chlorazol Blue 3 B is a color closely related and has been used instead of Trypan blue.

Elimination of Sodium Arsanilate is by the skin and the kidneys. May cause transient albuminuria, the bulk is in the urine. The excretion usually amounts to 50—90% within nine hours. The amount remaining is to some extent decomposed, so that sometimes toxic symptoms of inorganic Arsenic are produced. Fortescue Brickdale thought there was no advantage in giving in syphilis and anæmia a rapidly eliminated form of Arsenic in large dose, rather than one which being slowly excreted can be given in small doses. In trypanosomiasis it is thought that a small amount of organic Arsenic combines, through the Amido group, with the proteins of the blood plasma, from which the Arsenic is set free, and in a nascent condition kills the trypanosomes.

For poisonous effects and their treatment, see Vol. II.

For further details of action of Arsanilate and allied bodies on Trypanosomes *vide* 'Salvarsan,' by M. & W., p. 168 *et seq.*

℗1 Sodii Acetylarsanilas.

Syn. SODIUM ACETYL-P-AMINOPHENYLARSONATE, ✱ARSACETIN (T.M. 305705), P.G. VI. ACETYL-ATOXYL.

$C_6H_4NH.CO.CH_3.AsO_3HNa = 281{\cdot}0052$. (P.G. and P. Belg. IV.+ $4H_2O$.)

Dose.—*Per os* ½ grain (0·03 Gm.) three or four times a day.

Colourless Crystals. *Soluble* in water 1 in 10, insoluble in alcohol.

In syphilis, malaria, trypanosomiasis. A course of 20 injections of 0·6 Gm. spread over 10 weeks. In the case of diseases of metabolism smaller amounts —0·1 to 0·3 Gm.

Caution.—This dosage is quoted in Gehe, but the preparation came under serious consideration years ago. Bagshawe, L. ii./09,1193, reported blindness after its use in trypanosomiasis.

In syphilis, 0·5 Gm. was toxic.—L. ii./08,1315.

P.G. VI. states maximum single dose 0·2 Gm.

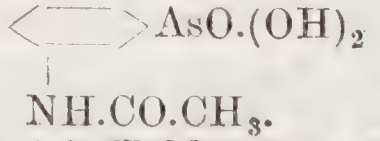
For further data see E.P. XVI., p. 167.

Arsacetin specially recommended in pernicious anæmia, leukæmia, and lymphadenoma.—B.M.J.E. ii./24,63.

℗1 Sodium *p*-Hydroxy-*m*-Aminophenylarsenate or '189.'

First results of treatment show that this salt has favourable action on human syphilis although not so powerful or constant in its results as Salvarsan. It is relatively slightly toxic and is supported by patients who do not tolerate other arsenical preparations.—J. C. S., 1922, Ai 300.

✱**℗1 Stovarsol.** (T.M. 432473). *Syn.* ACETYLAMINO-OXY-PHENYL-ARSONIC ACID, Acetarsone, ✱Kharophen (T.M. 493420), ✱Orarsan (T.M. 481226), ✱Spirocid (T.M. 341748), ✱Troposan (T.M. 472029).



$HO\langle\rangle AsO.(OH)_2$

$NH.CO.CH_3$.

Dose.—4 grains (0·25 Gm.) in Tablets *per os.* Stated to be readily absorbed from the gastro-intestinal tract.

Colourless crystals, practically insoluble in Water and Alcohol 90%. The compound has high As. content (27% approx.) and low toxicity. It was introduced by Fourneau and Levaditi in 1922.

Manufacture.—See Edn. XIX. p. 192.

Uses.—In amœbiasis, frambœsia (yaws), lambliasis, malaria (*Plasmodium Vivax*) and the early treatment of syphilis.

AMŒBIASIS in acute cases destruction of cysts entails dosage of two tablets per day for 10 days. Stated to cure when Emetine has failed. In chronic cases, 1 tablet the first day, later one tablet every other day for a week, then one tablet twice a week for several weeks. (For the combined treatment with Auremetine, *v.* p. 528.)

There is no evidence that it is a direct amœbicide, but it has definite value in the chronic stage.—P. H. Manson-Bahr and R. M. Morris, L. ii./25,546.

The combined treatment of amœbic dysentery (in France) with Stovarsol and Emetine lasts 4 weeks and consists of administration of 0·5 Gm. of Stovarsol a day during 1st and 3rd weeks, and Emetine during 2nd and 4th weeks. The 'opening' treatment with Stovarsol alone consists of administration of 0·75 Gm. a day for 1 week, discontinued following week and resumed on 3rd week, followed for one or two months by daily dose of 0·25 Gm. Amœbæ disappear in 4 days and cysts in 8 days. Affects *Lambliæ* but *Trichomonas* resist it. Superior to Novarsenobenzol.

A failure in practically all acute cases of amœbic dysentery, but has tonic properties and worthy of further trial in anæmia or lowered vitality from whatever cause.—Drennan, U.F.C., '25,123.

Ref. to Kharophen.—L. i./29,1126.

FRAMBŒSIA (YAWS.)—The following has been advised: Two tablets the first day, three the second day, four the third day. Omit for one day, then four, three, and two tablets respectively on alternate days.

Used with success in spirillary diseases, *e.g.*, intestinal spirochætosis, ulcero-membranous-stomatitis, spirillary bronchitis, phagedenic ulcer, and Vincent's angina; also lesions resistant to Arsenobenzenes.

See also P. S. Selwyn Clark, Trans. Roy. Soc. Trop. Med., Jan. '27,373.

LAMBLIASIS.—One tablet a day for six days. The dose may be doubled and treatment extended, in cases with cysts. The dosage for children should be *pro rata*. Improvement with disappearance of cysts. Blastocysts, the cause of diarrhœa, destroyed.

MALARIA.—Marchoux considers it is effective against *Plasmodium vivax*, but not against *P. malariæ* or *falciparum*.—per L. ii./25,595.

Little, if any, effect, either as a prophylactic or in acute fever.—H. C. Clark, U.F.C., '25,192.

Said to be a useful adjuvant to Quinine.

Has specific action in destruction of *Balantidium Coli*.—R. Aguilar, U.F.C. '25,247.

SYPHILIS well treated, by 1 Gm. daily, with a total of 20 Gm. in the month. Bismuth in addition may be required. Has a general tonic action on the whole system.—C. Levaditi, L. ii./25,594.

Congenital syphilis in infants of 2 months treated with a daily dose of 0·12 Gm. for 4 days a week up to a total of 6·6 Gm.—B.M.J.E. i./26,52.

SPIRILLUM OR TICK FEVER.—Stovarsol gave good results.—A. T. Schofield, B.M.J. ii./27,1140.

CHRONIC RESPIRATORY DISEASES treated with doses of 0·5 Gm., given for 10—15 days, interrupted by intervals of equal duration. Hepatic or renal insufficiency contraindicated.—B.M.J.E. i./26,48.

VINCENT'S ANGINA and ulcerating stomatitis treated.—B.M.J.E. i./26,35.

Toxic symptoms sometimes occur, *e.g.*, diarrhœa, vomiting, headache, and cutaneous eruptions.—per Pres., Aug. '29,282.

Exfoliative dermatitis due to continued use.—J. C. Michael, Jl.A.M.A. i./29,645.

One tablet of Stovarsol (0·25 Gm.) taken immediately after breakfast made a man violently ill. Copious draughts of warm water, also a Ferric Hydrate mixture, produced recovery. Symptoms were suggestive of Arsenic poisoning.—J. R. O'Brien, L. i./26,313.

℗ ✱**Stovarsol-Sodium**, *Syn.* SODIUM ACETYLAMINO-OXYPHENYL-ARSONATE.

For injection in framboesia (yaws), general paralysis, and malaria.

Ampoules contain 0·5, 1 and 1·5 Gm.

See also page 527, et seq.

℗ **Bismuth Acetyl-amino-oxy-Phenylarsonate.** *Syn.* ✱BISTOVOL (T.M. 460757). ARSYBISMOL.

For adults a series of 12 injections of 1·5 to 3 Cc. at intervals of 4 to 5 days has been suggested.

Stovarsol and Sodium Potassium Bismuth Tartrate interact, producing a white precipitate of this body. Ampoules contain 3 Cc. of 10% suspension in oil. Has a curative effect both on animal and human syphilis. It is injected intramuscularly in suspension in either saline or oil. With mice, found of value for *Trypanosomiasis nagana*. In general, the ill-effects of Bismuth or Arsenic are not observed.—C. Levaditi, L. i./26,215; B.M.J. i./26,207; J.C.S.A. i./25,1005.

Primary and secondary syphilis well treated by Bistovol *per os* either in solution or tablets. Well tolerated in doses of 2 Gm. daily for 8—11 days. Rapid disappearance of spirochætes and prompt cicatrisation of lesions.—C. Levaditi and L. Fournier, L. i./28,697.

℗ **Bimital** is an allied compound. *Dose*, 2 Cc. of 10% oily suspension intramuscularly in syphilis. It occurs as a yellow insoluble powder containing 41% Bismuth and 15% Arsenic.—C.D. ii./25,434.

✱ℙ1 **Acetylarsan** (T.M. 444635).

Available in solution containing 23·6% of Oxy-acetylamino-phenylarsonate of diethylamine. Solution contains 0·05 Gm. Arsenic per Cc. Elimination complete in 36 hours. Trial injections of 1—2 Cc. subcutaneously or intramuscularly and then 8—10 weekly injections of 5 Cc.—L. i./27,26. See also B.M.J. i./27,111.

The compound itself is a white, crystalline substance, soluble in water. Subcutaneous or intramuscular injections are painless and the drug is only slightly toxic. Used in hepatitis with success—dose, 0·75 Gm. once a week for 4 weeks. Treatment of *amœbiasis* (in France) with Acetylarsan and Emetine combined lasts 4 weeks, Emetine being administered the 1st, 2nd and 3rd day of each week and Acetylarsan on the 4th day in dose of 0·75 Gm. The opening treatment with Acetylarsan consists of primary injection of 0·75 Gm., with 3 days later a second dose of 0·75 Gm. and a succession of injections of same dose at intervals of 8 days until 6 or 7 doses have been given. Amœbæ disappear shortly after 8th day ; cysts disappear at same time and in same way. *Lambliæ* disappear the morning following the first injection, as also *Trichomonas*. Less toxic and more effective than Novarsenobenzol.—Ch. Garin and P. R. Lepine, Int. Conf. Trop. Am. '24, p. 315.

Effect on *S. pallida* equal to that of the Arsenobenzenes, and serological effect compares favourably. More frequently followed by minor toxic effects than the Arsenobenzenes.—V. E. Lloyd, L. i./28,1323.

ℙ1 **Parosan.**

Dose.—3 tablets daily (0·75 Gm.) for 14 days, with similar interval before repeating.

An organic Arsenical compound, "8-acetylamino-3-hydroxy 1 : 4-benzisoxazine 6-arsinic acid." Has some analogy with "Stovarsol" and "Tryparsamide."

Uses.—In disseminated sclerosis and neurosyphilis. Of little use in early syphilis.

ℙ1 **Treparsol.** *Syn.* Formyphénarsine, P. Belg. IV. OXYFORMYL-AMINO. PHENYLARSONIC ACID. Tablets contain 0·25 Gm.

ℙ1 ✱ **Halarsol.** (T.M. 465410). 3-AMINO-4-HYDROXYPHENYL-DICHLORARSINE HYDROCHLORIDE.

Dose.—*Intravenously* at intervals of 4 to 5 days from 3 to 6 Cc. of a 2·5 % solution (less for children). A single injection frequently suffices. *Intramuscularly* in very small children 1·5 to 2·5 Cc. Immediate sharp pain lasting for an hour, with dull ache for 2 days. *Subcutaneously* too painful.

Uses.—May be the drug of election for rapid sterilisation of yaws.—K. W. Todd, T.R.S.T.M., June,'31,65.

ℙ1 **Carbarsone.** *Syn.* 4-CARBAMINO-PHENYL ARSONIC ACID $H_2O_3As.C_6H_4\ NHCONH_2$.

Dose.—0·25 Gm. twice daily for 10 days in gelatin capsules.

A white crystalline solid first prepared by Ehrlich, without odour or taste, containing 28·85% Arsenic. It is practically insoluble in water, but dissolves in alkaline aqueous solutions and melts at 174° C.

Uses.—In the treatment of amœbiasis. Of 40 unselected cases 36 were 'cured.' It is stated to be less toxic than Stovarsol, but more amœbicidal, but caution is advised until it is decided whether or not it may injure the eye. The Arsenic is only slowly liberated and care must be taken to avoid Arsenic toxicity. It is non-toxic in clinically effective doses.—A. C. Reed and Co-workers, Jl.A.M.A. i./32,189—198. Apparently effective—*ibid.* 231.

ℙ1 ✱**Tryparsamide.** (T.M. 446503). *Syn.* ✱MORANYL (T.M. 458062), SODIUM-*n*-PHENYL-GLYCINAMIDE-*p*-ARSONATE, P. Ital. V., Glyphenarsinum, P. Belg. IV.

$H_2N.CO.CH_2.NH(C_6H_4)As.ONa$: O.OH=296·021.

Dose.—1 to 2 Gm. by injection, weekly.

A derivative of Atoxyl, having *pentavalent* Arsenic in its molecule

ith low toxicity the minimal lethal dose for mice on intravenous jection was over 2 Gm. per kilo, which is about 1/20 the toxicity f salvarsan.

SLEEPING SICKNESS has been treated with it—about 2 Gm. was found to e efficient and safe intravenous dose, although as high as 7 Gm. were given.—acobs and Heidelberger; Brown and Pearce, B.M.J. ii./22,1183. See also iss Pearce, Jl. Trop. Med., Feb., 15/23,70, and further abstracts *postea*.

40 cases in the Belgian Congo treated. A course of eight weekly intravenous jections was given, each injection in a solution made with boiled rain water a concentration equal to 3 Gm. in 10 Cc. The dose should not exceed 4 Gm. week. Removes trypanosomes from the cell content of even the most lvanced cases.—C. C. Chesterman, B.M.J. i./23,149.

African sleeping sickness can be cured. The dose of 4 Gm. should never be xceeded and the maximum tolerated dose should be arrived at gradually and ust be maintained for at least 10 injections, which can be weekly or fortghtly. Adults receiving less than 0·05 Gm. per kilo will relapse, and children n stand double this amount, *i.e.*, 0·1 Gm. per kilo. If toxic amblyopia velops, substitute Tartar Emetic for three weeks—Sodium Thiosulphate jected is apparently ineffective in preventing amblyopia.—C. C. Chesterman, ii./25,965.

Gives considerably better results than Bayer '205' and neither shows any periority over intrathecal injection of Salvarsanised serum.—C. H. Marshall nd S. M. Vassallo, Jl. Trop. Med., Mar. 15/'26,88.

Cleared the blood in infections with *T. gambiense* in from 6 to 12 hours in oses of 1 to 5 Gm. intravenously. Dimness of vision the only untoward mptom.—P. Manson-Bahr, L. i./27,132.

In patients of the first stage, a total dosage of ***20 to 40 Gm.*** usually ***cures,*** it in chronic cases 50 to 100 Gm. is necessary (Van den Branden). The best osage for adults in good condition is 3 Gm. weekly, and in poor condition to 3 Gm.; for children 0·5 to 2 Gm. Action is rapid, durable, constant, nd superior to any other drug, relapses or incomplete cures being due to xtraneous causes; toxic reactions are negligible, cases of total blindness corded being due to previous Arsenical treatment (Marugo). Treatment ith Soamin and Tartar Emetic more prolonged and more uncertain than ith Tryparsamide; in 25 out of 61 cases treated with the latter the spinal uid became normal (Van den Branden). Of 100 cases treated all were cured, in advanced cases the disease was completely arrested. Can be given ther intravenously, intramuscularly, or subcutaneously. Quicker, easier, nd less painful than Atoxyl, and the ***most efficient drug so far vailable.*** (Kellersberger.) The single course of 50 Gm. for an adult ppears to cure 52% and to ameliorate greatly 48% in the second stage. ccidents insignificant and ocular troubles rare and not severe (Infante). he drug is of great moral value to the natives, who are beginning to have as uch confidence in the treatment of sleeping sickness as they have in the eatment of yaws and syphilis (Trolli).—Abstracts of eight papers on the use Tryparsamide, Ann. Soc. Belge de Med. Trop., per T.D.B., Oct., '28,790–794.

Results of use in 1,000 cases. Exerts unique action on advanced cases, it equally satisfactory in early cases. A drug capable of oral use would be benefit—a German preparation called '4002' has given promising results xperimentally *per os*.—Louise Pearce, Rockefeller Inst. Monograph 1930; .M.J. ii./30,1094.

Though first employed in trypanosomiasis, it is now used almost xclusively in the treatment of :—

Neurosyphilis. General condition of patients improved—sense of ell-being.—D. Lees, B.M.J. ii./25,14.

Marked serologic improvement in majority of cases of all types. 50 or more jections are usually required over a period of a year or longer. Very ntoward symptoms.—H. C. Solomon and H. R. Viets, Jl. A.M.A. ii./25,331.

Does not possess an unusual power of penetration into the central nervous stem.—Am. Jl. Syph., per Jl. A.M.A. ii./25,1088.

Neurosyphilis treated intravenously, and in some cases subcutaneously, in eekly doses of 3 Gm. in 10 Cc. water over a period of 8 or 10 weeks. At the me time Mercury Salicylate intramuscularly in 1 grain doses. Reactions

both early and late appear to have been considerable, including visual disturbance in 20% of cases. There was a good effect on nutrition.—J. D. Silverston, L. ii./26,693.

A first course of 8 weekly injections of 2 to 5 Gm., combined with spinal drainage, followed by a second course, six months later, exactly as the first, except that after the spinal drainage 30 Cc. of a 30% sterile Sodium Chloride solution is given intravenously. Improvement mostly symptomatic. Ocular effects occasionally caused, but not more often than with other Arsenicals. Has little or no effect on the serologic reactions in general paralysis, and is of use in tabes.—J. M. Wolfsohn and C. Leiva, Jl. A.M.A. ii./25,495–496.

General Paralysis and Tabes.—In 20 cases treated at Maudsley Hospital no remarkable results were obtained. Similar improvements might have been obtained with other Arsenicals.—W. S. Dawson, L. i./25,1072.

In general paralysis, particularly megalomanic forms, the prolonged use is worthy of trial. 1 to 2 Gm. doses given at weekly intervals intravenously.—M. Brown and A. R. Martin, L. ii./26,699. See also Jl. A.M.A. i./27,475.

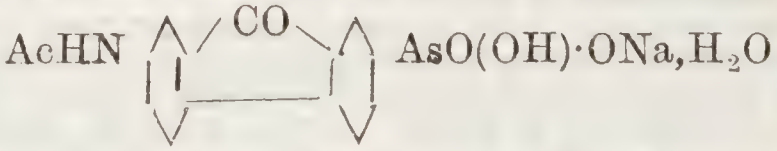
Tryparsamide as adjuvant to malaria treatment caused improvement.—J. H. Ewen, L. ii./30,690.

Tonic and ameliorative. Begin with 1·5 Gm. and increase by 0·5 Gm. to a max. weekly dose of 3 Gm. intrav.—J. P. Steel, Pr., Oct. '31,484.

'Tryponarsyl Meurice' is a Belgian product of the same chemical formula as Tryparsamide and having the same action on human trypanosomiasis.

Amphoteric Arsenical Compounds, *i.e.*, those containing both basic and acidic groups, are more frequently trypanocidal than the non-amphoteric.—King and co-workers, mentioned by Francis N. Carr, Pres. Address, Soc. Chem. Industry, 1927.

℗ **Sodium 7-acetamidofluorenone-2-arsonate**



has been prepared by G. T. Morgan and Jessie Stewart in an investigation of the **Arsonic Acids of the Fluorene Series.** It forms bright yellow needles, and has M.L.D. 15 mgr. per 20 Gm. mouse, with Therapeutic activity of 10 mgr. curative (5 mgr. some action).

Glycine and Glycinamide compounds have also been made with higher M.L.D.—respectively 50 and 30 mgr.—with some therapeutic activity in maximum doses.—(Chem. Res. Lab., Teddington) J.C.S., March, 1931.

Fluorene. *Syn.* ortho-Diphenylene Methane $CH_2<^{C_6H_4}_{C_6H_4}=$ 166·078 is present in tar. Colourless leaflets with violet fluorescence. M.pt. 113° C.

℗ **Succinyl Derivatives of *p*-Arsanilic Acid.** (New Derivatives of *p*-Arsanilic Acid, Part I.

A new series of quinquevalent Arsenic compounds made by E. Walton from Atoxyl. They are distinguished by presence of the group NH.CO.(CH_2)x.CONRR′. In this series x=2. The starting point is **Succinyl-*p*-arsanilic Acid,** made by condensing Atoxyl with Succinic Anhydride. Treatment of this acid with Methylamine or Aniline yields the Methylamide or Anilide respectively. Heating Succinyl-*p*-arsanilic Acid produces the Imide. This is converted into the Amide. By a similar treatment with Dimethylamine or Piperidine the Imide yields the Dimethylamide or Piperidide. Reports on the Sodium salts of the **Amide, Dimethylamide** and **Anilide** indicate low toxicity accompanied by therapeutic activity, and in

nese respects the new Succinyl derivatives compare favourably ith Tryparsamide when tested on mice infected with *T. rhodesiense*. -J. Stewart, Brit. Assn. Meeting, Bristol, 1930. See also full ccount by Prof. G. T. Morgan and E. Walton, J.C.S., March, 1931.

Malonyl Derivatives of *p*-Arsanilic Acid (NEW DERIVATIVES OF *p*-ARSANILIC ACID, PART II.).

Treated with Ethyl Malonate, *p*-Arsanilic Acid failed to yield *p*-Arsonoalonalic Acid (D.R.P. 191548), but the corresponding Ethyl *p*-Arsonomalonilate readily gave Malonanilomethylamide-*p*-Arsonic Acid with cold aqueous ethylamine, and under pressure with aqueous Ammonia, Diethylamine and thylamine, yielded respectively the Amide, Diethylamide and Ethylamide; e Piperide and Anilide were also prepared, and the Diarsonic Acid by consing Malonyl Dichloride with *p*-Arsanilic Acid. Reports on the Sodium lts of these acids shows the therapeutic activity of the Malonyl series to be ightly lower than the Succinyl series.—G. T. Morgan and E. Walton, J.C.S., ly, '31,1743.

***p*-Arsonoglutaranilic Acid and related Compounds.** (NEW DERIVATIVES *p*-ARSANILIC ACID. PART III.) The Sodium Salts of many of these rivatives show considerable curative trypanocidal activity on mice.—Prof. T. Morgan and E. Walton, Jl. Chem. Soc., Jan.,'32,276-280.

(iii.) *Diphenyl Nucleus Series.*

P 1 Dioxy - diamino - arseno - benzol Di - hydrochloride,—ARSENOENZENE, ARSENOBENZOL, ARSPHENAMINE (U.S. X.), ARSENIENOL-AMINE, AMINO-ARSENO-PHENOL, ✱ARSENOBILLON (T.M. 3809), DIOXYDIAMIDO-ARSENOBENZOL DI-HYDROCHLORIDE, KHARSIVAN (T.M. 363586), ✱SALVARSAN, P. Argent II., P.G. I., EHRLICH-HATA, or '606, $C_{12}H_{12}O_2N_2As_2(HCl)_2 2H_2O = 474{\cdot}9304$. The compound is believed to have a di-benzol nucleus coupled together two trivalent Arsenic atoms.

or *Dose and Methods of Injection* see p. 194, *et seq.*

PATENTS.—*The Patents concerned with the manufacture of this compound have pired.*

Details of procedure are given in "Salvarsan," by M. & W. See also In. XIX., p. 194.

TRADE MARKS: "SALVARSAN" and "NEOSALVARSAN."

No. 310235 for the former and Nos. 340386 and 340387 for the last-mened were "suspended" in favour of British houses during the war, but is order was *revoked* in 1923. In 1929 both Marks were reassigned to German uses.

The compound is available in ampoules, each containing 0·6, 0·5, 0·4, 0·3, 2 or 0·1 Gm. filled with inert gas to prevent oxidation. If discoloured—her grey or brownish—it must not be used.

Therapeutic Substances Act, 1925.—Under this Act and the atutory Rules and Orders 1927, No. 486, in force since August, 1927, Arsenonzol, commonly known as *Salvarsan, and analogous substances used for the ecific treatment of infective disease*, are controlled by Licence, under the nister of Health in England and Wales, the Scottish Board of Health in otland, and the Minister for Home Affairs in Northern Ireland, both with gard to manufacture and standards of strength, quality and purity.

The **Standard Preparations** of Arsenobenzene, etc., are kept in the National stitute of Medical Research, Hampstead. Biological Tests and tests for bility are applied. The label must state that the contents have been ted in accordance with Regulations under the Act.

Tests for Toxicity and Therapeutic Tests (M.R.C.) are provided in Vol. II.

Introduction.—Ehrlich and his assistants (notably S. Hata of kyo) conducted research (*vide* "Die Experimentelle Chemotherapie r Spirillosen"), which led finally to the introduction of Arsenonzol for treatment of syphilis and other affections. It was hoped e compound would effect a "sterilisation of the system."

For further notes on its introduction, Parasitotropic and Organotropic Compounds, see Vol. II.

Arsenobenzol solutions kill protozoa *in vitro*, and the $\frac{C}{T}$ ratio, *i.e.*, $\frac{\textit{Curative dose or sufficient to destroy all parasites}}{\textit{Toxic dose or Max. dose which patient can tolerate}}$ for the substance is satisfactory.—Ehrlich maintained that this ratio must be $\frac{1}{5}$ or less for a drug to be of value in this type of disease.

Note.—The

Chemotherapeutic Index (R) $= \frac{\text{M.T.D.}}{\text{M.C.D.}} = \frac{\text{Max. tolerated dose}}{\text{Min. curative dose}}$.

If it is fairly large (5 to 10), the minimum curative dose is sufficiently far removed in quantity from the maximum dose tolerated for the drug to be useful. In the case of the Veronal group introduction of one unsaturated (Allyl) group increased the therapeutic action more than the toxicity, so the R is raised. The most efficient and safe members are the Diallyl body (Dial) and the Isopropyl compound.—G. Malcolm Dyson, P.J. i./26,3.

Specific Nature of the Treatment.

Ehrlich made numerous statements regarding *specific action* of Salvarsan. The subject is fully dealt with in "Salvarsan" by M. & W., pp. 19, 20.

Bactericidal Power.

Arsenobenzol kills hæmolytic *streptococci*, but only after 3 hours. May injure blood corpuscles. In practice, results doubtful.—Colebrook quoted by Sir A. Wright, B.M.J. ii./30,735.

No ordinary antiseptic is bactericidal intravenously.

Salvarsan in high dilutions, not themselves bactericidal, increased bactericidal power of the blood for *S. pyogenes*, but protozoal infections (*e.g.*, bilharzia) are eradicated by Antimony.—Prof. Fleming and others, L. i./31,350.

Manufacture. — *p*-Oxyphenylarsonic acid—$C_6H_4.OHAsO(OH)_2$ on nitration and subsequent reduction under certain conditions produces a condensation of two molecules forming ultimately the Dioxy-diamino compound. This base is then converted into the Di-Hydrochloride. *Vide* Patents for further details.

The varying toxicity of commercial samples is apparently due chiefly to presence of sulphonic derivatives formed during reduction process with sodium hyposulphite. If ***hypophosphorous acid*** is used the product is relatively non-toxic.—J.C.S.A., 1920, 42, p. 2402. T., 1921, 1109 and 1415.

The compound forms a bright yellow powder containing 31·6% approximately of Arsenium. According to the Therap. Substances Act not less than 30% or more than 34%.

Soluble in water 1 in 5 forming a thick syrupy liquid with acid reaction, but not acid to Congo-red paper, 1 in 3 Methyl Alcohol and in Glycerin; 1 in 12 in Ethyl Alcohol. Insoluble in Ether.

The Di-Hydrochloride may be converted into the basic substance Dioxy-diamino-arsenobenzol (No. 592 in Hata's series) of the formula $C_{12}H_{12}O_2N_2As_2$=365·9196. by treatment with alkali. This base is an unstable, easily oxidisable, *insoluble* substance containing 40·98% of Arsenium—readily soluble however in Alkalis.

Uses.—The acidity of Arsenobenzol must be neutralised at the time of use; it has been largely replaced by Novarsenobenzol, but the compounds are similar in effect; the description of uses, etc., below applies also in a large measure to the latter.

A syphilitic chancre, a secondary syphilide or ulceration, or a tertiary gumma or ulceration, yields remarkably to the arsenical; every stage of syphilis treated, however, *requires Mercury subsequently*. They are also of value in acquired or congenital syphilis, but in

parasyphilitic affections they have not yet been proved of great benefit, though they may prevent their progress.

Visceral syphilis, Discussion on—especially of the central nervous system and cardio-vascular system. Sir Clifford Allbutt states that the syphilitic process wherever it is found consists in a lymph-arteritis with consequential irritative and atrophic effects. The division of syphilis into time periods—primary, secondary, tertiary and visceral—is misleading. The pyrexial phase, slight as it may be, indicates a general syphilitic sepsis in which the cerebro-spinal system is soon involved. Early necropsies have shown that in the pyrexial phase the aorta, brain, liver and other viscera become infected and the cerebro-spinal system does not long escape.—B.M.J. ii./21,177.

Although Salvarsan may kill all spirochætes in the skin and mucous membranes, it may not go deeper—hence, both exospinal and intraspinal treatment may be needed from an early stage. Within limits the more parasites that are killed the better time it may be for the best. Small repeated doses preferable to two or three big doses.—Sir T. Clifford Allbutt, B.M.J. ii./21,177.

Organic Arsenicals have no marked effect on spirochætes in the test-tubes, but they destroy them in the body.—Prof. W. E. Dixon, B.M.J. ii./22,410. *The body of the patient co-operates.*—H. H. Dale, B.M.J. i./22,807.

Note.—Writers designate the causative organism of syphilis, Spirochæta, Spironema, Treponema, etc.

Use in Malaria, Yaws, Frambœsia, Leprosy, Pernicious Anæmia and other diseases—It is thought that not only is the substance specific for syphilis, but that it probably acts against *Spirillosa* in general.

MALARIA.—Benign tertian infection. Arsenobenzol intravenously has a definite parasiticidal effect, but not on any stage of the malignant subtertian parasite; it intensifies Quinine.—J. Pratt-Johnson and co-workers, B.M.J. i./21,81.

YAWS has been treated by intramuscular injection. 0·6 Gm. injected into the buttock gives astonishing result. 12 intramuscular injections of Hectine, given daily, only equal in result one dose (0·6 Gm.) of Novarsenobillon.—J. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

FRAMBŒSIA.—Among 900 cases in Surinam there were only three unsuccessfully treated.—L. ii./11,1303.

VINCENT'S ANGINA.—A throat swab dipped in Glycerin and this in the powder and rubbed on to the affected parts in the throat. Not painful. Relief afforded after a few hours.—L. ii./13,1120.

LEPROSY.—Some reports have been favourable.

In SMALL-POX, no influence; TYPHUS favourable; in RELAPSING FEVER more active than in syphilis.—B.M.J.E. ii./11,4.

RAT-BITE FEVER successfully treated by Novarsenobillon 0·4, 0·6 and 0·9 Gm. at intervals.—G. C. Low and R. P. Cockin, B.M.J. i./18,203.

Experimental determination of minimum lethal, minimum effective and maximum tolerated doses of Arsenic and Antimony compounds in trypanosome infection.—C. Voegtlin, H. W. Smith and co-workers, per T.D.B. 17/21,330.

CANCRUM ORIS in Formosa. Salvarsan has reduced mortality rate from nearly 100% to 25%.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

On *microfilariæ bancrofti*, intramuscularly, has toxic action. Periodical injections suggested for persons suffering from lymphangitis, funiculitis, etc., taking into consideration age and general condition of patient.—F. Noc, per Jl. Trop. Med., July 2/23,238.

Administration.—*Protect the liver by giving an ounce of glucos two or three hours before Arsenobenzol, the drug is then tolerated better*

Arsenobenzol is usually given intravenously by the gravity metho Intramuscular injections into the gluteal muscles, are now little used on account of the pain produced. Novarsenobenzol and Metarsenobillon have superseded for that route.

Preparation of the Injection.—Dissolve the dose in about 10 Cc. of Sterile Water and make it alkaline by adding Normal Caustic Soda solution (40 Gm. per litre), using the amount on the label required to dissolve the dose. A precipitate is formed which redissolves on shaking. Dilute with Normal Saline so that each 0·1 Gm. is contained in approx. 20 Cc. of solution. Injection is usually through one of the veins of the fold of the elbow, *e.g.*, the median cephalic, but any prominent vein may be used.

Dose.—0·1 to 0·6 Gm. Early syphilis is generally treated with from 0·2 to 0·3 Gm., and a number of injections, at intervals of a few days, gradually increasing up to 0·6 Gm., are given, with a total of 4 to 5 Gm. This course usually is *repeated* after an interval varying from 4 to 6 weeks, and *three or four such courses* are generally required. The injection should not be given immediately before or after a meal. A mild purgative before the injection lessens the liability to untoward reactions. *Children* may receive from 0·02 to 0·2 Gm., according to age, but Metarsenobillon subcutaneously, or Novarsenobenzol intravenously, are preferable in such cases.

'*Combined Treatment*' with Mercury *vide postea.*

Patients should be treated in bed and observed for at least three days. If patient shows during administration any signs of collapse, the injection should be stopped at once.

℞ ℙ 1 **Arsenobenzol Suppositories.**

Arsenobenzol 0·1 Gm., Cocaine 0·1 Gm., Almond Oil *q.s.*, Theobroma Oil to 1·0 Gm. Not to be kept more than 48 hours. May be coated with beeswax as protective.

ℙ 1 **Supsalvs.**—A proprietary brand containing 0·1 (adult) and 0·03 Gm. (infants).

Combined Arsenobenzol and Mercurial (or Bismuth) Treatment.

An analysis of records of 3598 cases treated at St. Thomas's Hospital V.D. Centre between January, 1920 and March, 1926.

A course consisted of not less than 5 Gm. of an Arsenobenzol compound (except with Silver-Salvarsan, *q.v.*) with a minimum of 5 grains of Mercury or 2 Gm. Bismuth, intramuscularly or subcutaneously, over a period of not more than 4 months. With Silver Salvarsan a total of not more than 2·5 Gm. was given, with or without Mercury or Bismuth. A second course was given 3 months after the first and completed in 4 months.

The results of treatment with Arsenobenzol compounds and Mercury, compared with those with Arsenobenzol compounds and Bismuth, ***showed no superiority of Bismuth*** over Mercury, though Bismuth was better tolerated. (The preparation of Bismuth used was mainly the Oxychloride suspended in Glucose solution.)

In sero-negative primary cases not less than two courses were necessary, and in sero-positive primary and early secondary cases even three courses did not give a satisfactory percentage of cures. Most relapses in early cases occurred in the first year, and a very small proportion after the second.

UNIT COURSE ON WHICH TREATMENT OF CASES ANALYSED IN REPORT WAS BASED.

Day.	Arseno-benzol Comp. Gm.	and Hg. grains	or Bi Gm.	Day.	Arseno-benzol Comp. Gm.	and Hg. grains	or Bi Gm.
1	0·45	—	—	50	0·75	1	0·4
8	0·45	1	0·4	57	0·75	1	0·4
15	0·45	1	0·4	78	0·75	1	0·4
29	0·60	1	0·4	85	0·75	1	0·4
36	0·60	1	0·4	92	0·75	1	0·4

(Potassium Iodide from 57th to 78th day.)

COURSE INSTITUTED 22/2/28.

In this course, the principle is to follow three short 'bursts' of '914' (which ought effectually to destroy accessible Sp.p.) with three rests of a month each to allow liver cells and skin to recover, and to finish with two full courses of '914.' The Bismuth is crowded into the first 10 weeks to build up a depot.

Day.	Arseno-benzol Comp. Gm.	Bi Gm.	Day.		Arseno-benzol Comp. Gm.	Bi Gm.	Day.		Arseno-benzol Comp. Gm.	Bi Gm.
1	0·45	0·4	43		0·75	0·4	85		0·90	—
8	0·45	0·4	50		0·90	0·4	92		—	—
15	0·60	0·4	57		—	0·4	99	K.I.	—	—
22	—	0·4	64	K.I.	—	0·4	106		—	—
29	—	0·4	71		—	—	113		0·90	—
36	—	0·4	78		0·90	—	120		0·90	—

—Col. L. W. Harrison, "The Treatment of Syphilis," Med. Res. Council, Special Report Series, 132, 1929.

The necessity of associating intravenous Arsenic with Mercurial treatment was confirmed by the French Military Medical Service during the war.

Bismuth or Mercury compounds in conjunction, *e.g.*, 0·1 Gm. of a Bismuth compound, with 0·45 Gm. Neoarsphenamine, may be given once a week. This obviates complications and gives as good results as obtained formerly with larger doses of Arsenobenzol.—Jl. A.M.A. ii./29,1310.

Extra courses of Salvarsan, rather than Mercury, for prevention of Wassermann reactions and destruction of residual spirochætes. Grey Oil courses aid to increase tendency to relapses.—Prof. E. E. Glynn, L. ii. /26,1075.

Modern aspects of syphilis. Every early primary case with negative Wassermann Reaction should receive 20—25 Salvarsan injections intravenously and some 16—18 of Mercury and Bismuth, or Mercury given *per os.*—W. H. Brown, B.M.J. ii./26,890.

War Office Method. Letter, May 8/16, No. 24/General/4912, A.M.D. 2.) *See* Edn. XIX., pp. 199,200.

Congenital Syphilis in Children.—Vary dose according to age of child: *e.g.*, for child 1 month old, initial dose of N.A.B. 0·05 Gm., —3 years 0·1 Gm., and for older children 0·15 Gm., increasing during the course of 6 injections to respectively 0·1 Gm., 0·25 Gm., and 0·3 or 0·45 Gm., subsequent courses starting with larger doses and reaching higher maxima, but not exceeding 0·45 Gm. for a child of 12. For older children commence with 0·04—0·06 Gm. and increase up to 0·36. Injections are given intravenously or intramuscularly in from 1 to 3 Cc. Distilled Water. Mercury is given either as Hyd.c.Cret., ½ to 1 grain thrice daily, or better still the oint-

ment rubbed in once a day, or Green Iodide of Mercury, 1/8 to ¼ grain, two or three times daily during injections. In older children 30 or even 40 Arsenic injections may be necessary.—D. Nabarro, Modern Technique in Treatment, Vol. III., p. 111.

Syphilis in Women. Weekly intravenous injections of 0·3 to 0·6 Gm., with a drink of lemon-flavoured Glucose Solution (3 oz. each of Glucose and Water) half an hour before, and a Hutchinson's Pill thrice daily. After a course of N.A.B. the pills are stopped for two weeks, and if the W.R. is negative and the case first seen in the primary stage, allow to carry on with pills alone for two months; but if case when first seen had well-established secondary lesions the patient is given pills to last a month and is then given a further set of injections, which may be slightly different from the first, *e.g.*, Sulfarsenol instead of N.A.B. During remainder of treatment W.R. is taken every three months and a further course of injections given if required. If all tests are negative and condition satisfactory, pills only are given during remainder of time. Standard of cure negative W.R. over two years.—Margaret Rorke, Modern Technique in Treatment, Vol. I., p. 146.

'Alternating' treatment economical and successful, whilst ***'Concurrent'*** is wasteful and productive of greater number of uncured syphilitics.—E. Tytler Burke, L. i./31,1127.

Adequate treatment of syphilis. Further discussion.—L. W. Harrison, Howard Allen and D. Lees in reply to Col. Burke, L. i./31,1265.

First place given to '606'—hits the spirochæte harder and longer than '914' in dosage equivalent in terms of Arsenic, but reactions deterred many patients from continuing. The Sulpharsenobenzene class subcutaneously better than '914' intravenously, but painful and more likely to cause aplastic anæmia. More '914' used in the Clinic, but more Sulpharsenobenzene in private cases. Mercury reserved for cases in which Bismuth is impracticable—Calomel best, followed by Mercurial Cream (not greater than 10% strength). —Col. L. W. Harrison, B.M.J. ii./31,157.

Warnings, Contraindications, After-effects, and Treatment of Toxic Effects following Arsenobenzol Compounds.

It should not be given to aged and infirm patients, or where there is a general exhaustion of vitality following the severity of the syphilitic poisoning, especially in persons already suffering from chronic organic diseases of the kidneys and from chronic degenerations of the cardiac muscle, patients with definite atheroma of the arterial coats, such as have already suffered from anginal attacks or from signs of cerebral hæmorrhage, add to these, patients with diabetes, tabes dorsalis and general paretics, and lastly any case in which there is or has been recent endocarditis. Extreme caution is necessary in cases with signs of active pulmonary phthisis, owing to the congestive action of the drug.

Idiosyncrasy to Arsenic in general may exist in the patient. If necessary, try the effects of Fowler's Solution *per os*. Patients giving a positive reaction should not receive the injection.

After-effects.

A drink containing Glucose 2 ounces, given ½ hour before injection, appears to reduce jaundice.

Among after effects have been observed:—Headache, numbness of the imbs, sickness, skin eruptions—urticaria, acute dermatitis, erythema, and jaundice. Effects on the eye: iritis. (A person with unsound eyes must not receive the injection.) Pyrexia; sensory nerve complications; defects in hearing have been reported.

Two fatal cases of icterus gravis following Novarsenobillon.—B.M.J.i./18,448.

Jaundice. 115 cases in 7,000 patients.—Col. Bolam, B.M.J. i./19,489. Evidence is that the arsenical is conducive. It is more common with 'Neo' than with the original.—R. Hallam, L. i./20,1356. See also A. T. Todd, L. i./21,632.

Atropine, Quinine, Lead, Copper, Zinc, and Bismuth pass over in the mammary secretion. From clinical observations the following are added:—Iodine, Salicylic Acid, Ether, Mercury, Phenazone, Aspirin, Arsenic, Morphine, Hexamine Acetanilide, Scopolamine and Luminal. ***Arsenic is found***

in the milk following Arsenobenzol treatment, so that caution is advised.—M. M. W., '26,322, per Pres., Feb., '27,65.

Risks of Arsenobenzol injections—Medical Research Council Report. Some degree of hepatic insufficiency demonstrable 3 months after a course—but the treatment thought justifiable.—L. ii./22,193.

Toxic effects, and their treatment.

If doses of 0·6 Gm. Arsenobenzol are repeated too frequently toxic effects are frequent, epileptiform convulsions coming on within 5 days, and often ending fatally. According to a German edict a few years ago a single dose must not exceed 0·4 Gm. Even 8 doses of 0·3 Gm. in 28 days with Mercury is unsatisfactory—*dermatitis and jaundice* follow. Both these are apt to be fatal.

It is certain the drug can cause death. It is very unwise to inject a total of 1·2 *Gm.* (2 doses of 0·6 Gm.) within three days—a wider interval is important.

Delayed Arsenical poisoning from Arsenobenzol preparations. A report of a number of cases, some fatal.—G. S. Strathey, L. i./20,802.

Daily intravenous injections of *Sodium Hyposulphite* recommended when Salvarsan poisoning threatens. *Has never failed and no ill effects have been observed from it.*—B.M.J.E. i./27,93.

Sodium Hyposulphite Sterules, 0·2, 0·45, and 0·6 Gm., are prepared. Three or four injections of 0·2 or 0·45 Gm. intravenously on alternate days in Arsenical Poisoning.

See Sodium Hyposulphite see p. 87.

Calcium Chloride 10% solution in Salvarsan Poisoning given separately or with the injection prevents toxic symptoms.—B.M.J.E. i./22,94.

Severe vasomotor disturbance : Adrenalin Chloride 1 : 1,000, 10—15 m. subcutaneously.

Cerebral symptoms with severe epileptiform convulsions : lumbar puncture, 20—30 Cc. fluid being withdrawn.

Erythema : Alkaline Glucose Solution (25%), 25 Cc. intravenously, daily or every other day as required. Sodium Thiosulphate 0·6—0·9 Gm. intravenously, every day or every other day, also effective.

Exfoliative dermatitis : same treatment as erythema so long as bend of elbow not involved : diet as for typhoid fever. Injections not repeated for at least a year after recovery.

Jaundice : Glucose intravenously, and diet as for dermatitis. Bowels kept open and mixture containing Bismuth and Sodium Bicarbonate given.—L. W. Harrison, Pres., Sept., '26,323.

Atropine 1/50 grain hypodermically is also advised for immediate vasomotor reactions. The cardiac reactions are best treated with hypodermic injections of Strychnine 1/32 grain, Ether 30 minims, or Camphor 1½ grains. Later reactions, *e.g.*, stomatitis, affections of the central nervous system, liver complications and skin reactions, may be treated with Sodium Thiosulphate or Thiosinamin.—P. Power, Jl. R.A.M.C., Jan., '27,46.

Toxic effects not due to Arsenic content but to the amino-benzene derivatives. The 1922 Report of the M.R.C. Salvarsan Committee needs revision. —Semon, L. ii./31,914.

DISADVANTAGES OF SALVARSAN TREATMENT.

Dr. Dreuw, a Berlin specialist, gives the following statistics : (1) 84% of 8,000 soldiers so treated were not cured, (2) 13 practitioners report 101 fatal cases of Salvarsan poisoning in 1 year, (3) for every 100,000 persons treated with Salvarsan there were 620 with consequent skin complications, 1·3 cases blindness, 2·6 cases complete, and 4 partial, deafness, 62·2 cases of cerebral involvement, 224 of paralysis, and 16·2 deaths undoubtedly and 14·2 deaths probably due to Salvarsan.—B.M.J. i./24,441.

Local Anæsthetics.

Novocain injection—2 Cc. of 1% Solution has been advised before, and is said to render the injections painless. Ethyl chloride has also been used. Also Morphine in dose of 0·01 Gm. where pain is excessive with subcutaneous injections.

Injectio Salvarsan cum Novocain (Intramuscular).

Dose.—Salvarsan 0·3, Novocain 0·03, Normal Saline to 10 Cc.

This has been employed, but the pain caused may persist after the anæsthetic effect has passed off.—W. H. M.

Local Use.

For condylomata a powder containing Arsenobenzol as also a 50% Ointment strongly caustic when used in this manner and hence curative.

For milder effect a 10% Ointment in a mixture of equal parts Soft Paraffin and Lanolin is used.

Salvarsan in glossitis.—Swabbing with solution of 0·1 Gm. in water 30 minims and Glycerin ½ ounce was curative. At the end of a week ulcers diminished to quarter of original size.—A. Allport, B.M.J. ii./12,349.

Ordinary ulcers heal rapidly by local use of Salvarsan and Neosalvarsan as dusting powder.—H. Alston, B.M.J. ii./12,1748.

Intrathecal Injection of Patient's Serum after Salvarsan Treatment.—The transmission of *Sp. Pallidum* from the brains of general paralytics to the rabbit and the experimental production of syphilitic encephalitis in this animal (Noguchi's experiments), led up to this method.

The entire subject is dealt with in Edn. XVIII., p. 214.

Neuro-syphilis. Defined as comprising only such nervous or mental symptoms as are actually due to the syphilitic organism or its toxin. It does not mean the mere presence of nervous or mental symptoms in a syphilitic patient. The treatment is Salvarsan combined with Mercury, but 0·6 Gm. of the former intravenously is now considered risky. It is safer to give not more than 0·3 Gm. in repeated doses. *Salvarsanised serum* (patient's own blood), or human, or horse serum, mercurialised *in vitro*, is suited for tabes and cerebro-spinal syphilis. Arsenobenzol given direct intraspinally into the cerebro-spinal fluid is dangerous.—Sir. J. Purves-Stewart, B.M.J. ii./22,621. See also S. A. Kinnier Wilson, *ibid.* 628. See also D. K. Adams' 'Treatment of Neuro-syphilis with special reference to changes in the cerebro-spinal fluid.' (Cell counts and Colloidal Gold reaction), *ibid.* 630.

Parasyphilitic affections of the nervous system treated by Salvarsanised Serum by means of double puncture. Small dose of Neosalvarsan added to patient's serum, and part re-injected.—T. Brunner, L. ii./29,117.

"Salvarsan," by M. and W., provides abstracts of the literature of the subject ranging from March 15 to December 17, 1910. These constitute everything of importance that was written on the subject up to that date.

Further references are contained in the 15th–19th Editions.

Wassermann's Reaction, Effect on and other details. *See Vol. II.*

℗1✱**Eparseno** "132" (T.M. 422653) is stated to be a stabilised solution of Arsenobenzol for painless injection (it is *only* to be used this way) in the treatment of syphilis, yaws, recurrent fever, etc. It is supplied in ampoules each containing 1 Cc. of solution, corresponding to 0·12 Gm. of Arsenobenzol or 0·25 Gm. of Novarsenobillon.

℗1✱**Stabilarsan** (Brit. Pat. 177283 of 1922, T.M. 411118). A preparation of Arsenobenzol base with Glucose for injection, supplied in liquid form ready for use, either intravenously or intramuscularly, in ampoules.

Stabilarsan is based on the theory that a molecule of Arsenobenzol combines with two molecules of Glucose to form a definite chemical compound. This compound is stated to be relatively stable when exposed to the air. It is supplied in 50% Glucose solution. *Ampoules* contain 0·1, 0·15, 0·20, 0·30, 0·45, 0·6, 0·75 and 0·9 Gm.

In congenital syphilis the preparation is stated to be safe. For an infant 15 lbs. weight dose 0·075 Gm. (0·75 Cc. of the solution in the ampoule). For routine treatment of syphilis a course is given combined with Potassium Iodide on the lines of Arsenobenzol methods.

℗1✱**Sanogyl** (T.M. 421128). A tooth-paste to combat pyorrhœa; claimed o have a specific action on spirilla of the mouth, and to contain arsenobenzol. —P.J. ii./22,392.

℗1 **Pyorrhease.**
A tooth-paste containing Novarsenobenzol, for use in pyorrhœa, stomatitis, gingivitis, etc.

℗1 **Silver Salvarsan.** P.G. VI.
Dose.—Intravenously in 1% solution, one or two injections of 0·1 Gm. each, then 0·2 Gm, for women and 0·25 Gm. for men at intervals of not less than 4 days. Repeated at intervals until clinical symptoms and blood test satisfactory. In weakly patients begin with 0·05 Gm.

It is a brownish black powder, containing 22·5% Arsenic and 14% Silver, readily soluble in water, with alkaline reaction. Ampoules contain 0·05, 0·1, 0·15, 0·2, 0·25 and 0·3 Gm.

Clinically 0·1 Gm. corresponds to about 0·3 Gm. Novarsenobenzol. It is thought to have the combined effect of Arsenobenzol and Silver against syphilitic parasites. Mercury to be suspended during treatment.

Contraindications. Cardiac diseases, diseases of the liver and kidneys, and constitutional tendency to skin diseases.

SYPHILIS.—Efficient with pronounced effect on visible syphilis lesions. Absence of characteristic and often nauseating garlic-like odour noticed by patients receiving Salvarsan intravenously—no authentic case of argyria reported.—H. E. Michelson and D. M. Siperstein, L. ii./21,571. See also B.M.J.E. ii./21,1,54.

Probably about twice as effective as '914' in similar doses.—Col. L. W. Harrison, B.M.J. ii./21,944.

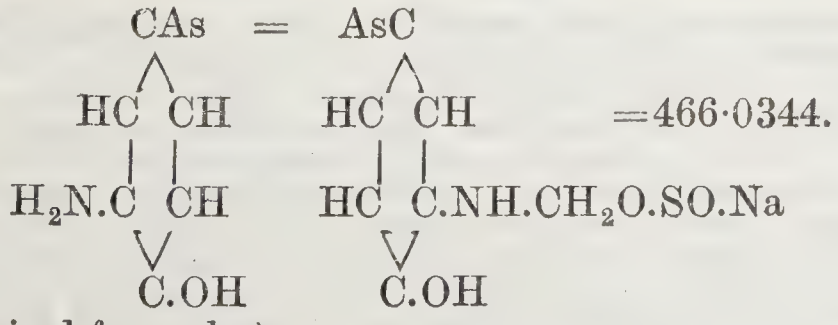
Late syphilis. Importance of thorough treatment in the first instance—to prevent late sequelæ. Sulfarsenol praised for use in myocarditis and aneurism. Tabes: Intravenous injections with deep subcutaneous injections. For intravenous use Silver Salvarsan and for subcutaneous Sulfarsenol. G.P.I.: Silver Salvarsan in large quantities.—Col. L. W. Harrison, L. i./23,4.

MULTIPLE SCLEROSIS. Silver Salvarsan the most effective remedy—0·05 Gm. twice weekly, increased to 0·15 or 0·2 Gm., the average total dose being 2·5 Gm. —B.M.J.E. ii./24,55; Jl. Trop. Med., April 15, '25,168.

The Silver is not combined with the Salvarsan in ℗1 **Sodium Silver Salvarsan** (another preparation), but is present merely in colloidal form.—W. H. Gray, P.J. i./23,216.

℗1 **Neo-Silver Salvarsan, P.G. VI.**
A molecular compound of Neosalvarsan and Silver Salvarsan in brown powder.

℗1 **Novarsenobenzene.** *Syn.* NOVARSENOBENZOL, NEO-ARSENPHENOLAMINE, ✱NEO-KHARSIVAN (T.M. 364607), ✱**Neosalvarsan** (No. 914 of Ehrlich's Series T.M. 340386, 340387 Assoctd., see Salvarsan), ✱NOVARSENOBILLON (T.M. 413810), ARSENOBENZOL ACID SODIUM FORMALDEHYDE-SULPHOXYLATE, SODIUM DIOXYDIAMIDO-ARSENOBENZENE-METHANE SULPHONATE. P. Argent.II., P.G. VI., NEOARSPHENAMINA, U.S. X., F.E. VIII., P. Belg. IV., NEOARSAMINOL, P. Svec.



(Theoretical formula.)

Brit. Patent No. 7865/12. Aqueous Solutions of Salvarsan and Formaldehyde Sulphoxylate give a precipitate which is soluble in a minute quantity of alkali to form an almost Neutral Solution. The product differs according

to temperature employed. At ordinary temperature the precipitate contains one "Sulphur-Acid" group, at 60—70° it contains two "Sulphur Acid" groups. See also Patent No. 8219/12. These Patents have now lapsed.

The soluble compound may be made directly from Sodium Formaldehyde Sulphinite, *Syn.* Rongalite.—G. Malcolm Dyson, P.J. i./26,32.

Novarsenobenzene under the THERAPEUTIC SUBSTANCES ACT, 1925, and the S.R. & O., 1927, No. 486, is made under license (*cf.* Arsenobenzene) and assayed biologically.

It is a yellow powder, readily soluble in water. The compound changes in the air; it is hence issued in sealed ampoules. The dry powder as taken from the sealed ampoules must contain not less than 18% or more than 21% of Arsenic. U.S. X. says not less than 19%. *Injections must be made immediately after preparation.*

Strength in comparison with Arsenobenzol.—It is 2/3 the strength.

Intravenous dose.—Many authorities recommend an initial intravenous injection of a small dose, *e.g.*, 0·45 Gm., followed by 8 to 10 doses at intervals of 3 to 8 days, gradually increasing the dose up to 0·9 Gm. as a maximum, repeating after an interval of 4 to 6 weeks. Three or four series may be required for complete treatment. Mercury or Bismuth is frequently given during the intervals. 0·15 to 0·45 Gm. is given in from 5 to 10 Cc. of water, or 0·6 to 0·9 Gm. in 15 to 20 Cc. water, by slow injection into the median cephalic vein. More concentrated solutions have been employed, *e.g.*, 0·9 Gm. in 2 to 3 Cc. water; concentrated solutions however require great caution.

Intramuscular Dose.—0·15 Gm. to 0·45 Gm. This should be dissolved in a mixture of **Guaiacol-Glucose** and water 10 to 20 minims, for injection into the buttock. The part should be massaged after injection. The absorption is slower, so it is probable that smaller doses suffice than by the intravenous method.

Guaiacol-Glucose Sterules 2 Cc. for preparing the intramuscular injection are made of the strength, Guaiacol 1, in 50% Glucose.

This method of procedure was advocated by T. Anwyl-Davies, L. ii./18,757. It was found painless. Even 0·75 Gm. will dissolve in 10 to 20 minims.

Uses.—As for Arsenobenzol. It is said to be better tolerated.

For contraindications and treatment of after-effects see Arsenobenzol.

References.

SYPHILIS.—*Subcutaneously* Novarsenobillon influences syphilitic lesions *more rapidly than intravenous doses of* Salvarsan or Arsenobillon. Experience of 1,500 subcutaneous or intramuscular injections of Neo-Salvarsan. Numerous methods were tried and are described, the best being to dissolve the Neo- (0·6 Gm.) in 1 Cc. of a 4% Stovaine solution and make up to 2 Cc., with a **Creo-Camph Cream** melting at 15° C., which is stated to be a 'special' formula. **Campho-Phenique,** instead of Creo-Camph., also used with encouraging result. Morphine $\frac{1}{3}$ grain is required to overcome pain. The injection is made about a point three finger breadths below the crest of the ileum on a line joining the tuber ischii with a point on the crest of the ileum which is perpendicularly above the great trochanter when the patient is upright.—L. W. Harrison, C. F. White and C. H. Mills.—B.M.J. i./17,569.

In syphilis of the central nervous system Novarsenobillon safe and most efficient.—H. Carlill, L. i/18,243.

Severe dermatitis from Novarsenobillon.—L. G. Leonard, B.M.J. ii./19,773.

Gastric syphilis treated by Mercury and Arsenobenzol.—D. J. Galloway, B.M.J. i./22,217.

Soft chancres treated by swabbing with 3% solution.—B.M.J.E. ii./22,18.

ANTE-NATAL TREATMENT OF CONGENITAL SYPHILIS. The focus of infecting spirochætes is probably the placental tissue. Arsenical compounds and Mercury at Glasgow given with 100% successes.—J. R. C. Greenlees, B.M.J. ii./21,654.

Four or five intravenous injections of Neosalvarsan with Mercurial inunctions during pregnancy. Results good.—B.M.J. ii./21,654,887.

INTRAPERITONEAL INJECTION in infants suffering from congenital syphilis with safety. A child of 10 lbs. should receive 50 mgm., or 5 Cc. of a solution consisting of 150 mgm. of Neo-arsphenamin dissolved in 15 Cc. warm sterile water. The usual treatment consists of four injections at three-day intervals, followed by 4 injections at seven-day intervals, the ideal site for entrance of the needle being in the middle of the left rectus sheath, slightly below the level of the umbilicus. The method is not as rapid as intravenous injections, but Neo-arsphenamin is absorbed with sufficient rapidity to act in any condition. It is ideal for children with small veins needing urgent treatment.—H. S. Sanford, Jl. A.M.A. ii./25,242—245.

Fewer injections required in the treatment of syphilis when combined with milk injections.—B.M.J.E. i./26,30.

Cardio-aortic syphilis treated by, each year, a series of 6 to 8 intravenous injections of Novarsenobillon 0·6 Gm. at weekly intervals.—T. F. Cotton, B.M.J. i./26,855.

Spirochetal pulmonary gangrene well treated with Neoarsphenamin intravenously.—B. S. Kline and S. S. Berger, Jl. A.M.A. ii./25,1452.

DISSEMINATED SCLEROSIS, early cases treated with Novarsenobillon. Six weekly intravenous injections (0·15, 0·3, 0·45, 0·45, 0·6, 0·6 Gm.) repeated at end of six months, with Arsenic *per os* in the interval.—W. Johnson, L. i./23,1209.

Sodium Thiosulphate simultaneously with "914" found to have no deleterious effect on therapeutic action.—L. W. Harrison, H. H. Dale and P. A. Clements, L. i./25,1161.

TRYPANOSOMIASIS.—Intravenous injection of Arsenical compounds, and an immediate subsequent attempt to sterilise the central nervous system by intrathecal injection of Salvarsanised Serum. The patient's treatment is complete in 2 days. Comparative tables of a variety of procedures. A dose of Neo-Kharsivan with 1 injection intrathecal serum gave a large percentage 'alive and well.'—C. H. Marshall and S. M. Vassallo (Uganda), B.M.J. i./21,773 ; i./23,231.

Marshall and Vassallo produced no satisfactory evidence that intratheca injections of Salvarsanised Serum sterilise infected cerebro-spinal fluids (in trypanosomiasis).—Prof. Warrington Yorke, L. ii /21,973,1077.

Cysts of *Giardia intestinalis*, *Chilomastix mesnili*, *E. Coli*, *E. histolytica*, and *E. nana* rapidly disappeared from stools of a man, following intravenous injections.—Carr and Chandler, T.D.B., Vol. 17, 1921,99.

MALARIA treated with conflicting results. Sodium Cacodylate recommended as an adjuvant to Quinine.—W. A. Murray, T.D.B., Vol. 17, 1921,142.

In early cases of simple tertian malaria an injection is a therapia magna sterilisans.—Jl. Trop. Med., Aug. '15,308 ; Jl. A.M.A. ii./25,151.

BRONCHO-SPIROCHÆTOSIS in China. Immediate relief ; recovery after second or third administration.—E. C. Faust, Jl. Trop. M., Jan. 1/23,14.

Intrathoracic injections valuable in suppurative lung conditions, *e.g.*, gangrene, abscess, empyema and bronchiectasis. First aspirate pus and inject 0·15 Gm. Neosalvarsan, and repeat injection every 4 or 5 days, increasing to 0·6 Gm.—per Pr., Aug., '29,155.

GUINEA-WORM.—Novarsenobillon, 0·6 Gm., is the best treatment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,39.

Massive doses given *intrarectally* in cases where intravenous injections are dangerous or undesirable. As much as 4 Gm., it is stated, may be given with safety.—H. G. Mehrtens, per Jl. Trop. Med., Nov. 1/22,348.

HEMIPLEGIA cured in 3 weeks by intravenous injections of 0·3 to 0·9 Gm. —L. Le Dentu. per Jl. Trop. Med., Oct. 1/23,312.

AMŒBIASIS has been treated with it *per os* in France.—L. ii./26,824.

TYPHUS FEVER treated intravenously. In two cases the course of the disease was aborted.—Glas. Med. Jl., Nov., 1913,376.

TUBERCULOSIS.—Organic compounds of Arsenic, *e.g.*, '914' (intravenously) and Sulfarsenol (intramuscularly) in pulmonary tuberculosis where Arsenic seems indicated—intramuscular route preferable. Improvement due to stimulation of the metabolic functions; there is no specific effect upon the bacilli.—J. Guy and G. B. Page, L. i./24,847.

CHRONIC LUNG AFFECTIONS treated with intrapleural injection of Neosalvarsan. The pleura tolerates high dosage, 0·45 to 0·6 Gm. in 10 Cc. water. It is a powerful antiseptic, especially against streptococci. It has been used in the bronchial tree in bronchiectasis.—L. ii./29,32.

Blood pressure is generally lowered by Neosalvarsan intravenously; it is certainly not increased.—H. D. Rolleston, B.M.J. ii./15,281.

LEUCOCYTOSIS is induced powerfully by Novarsenobenzol (0·3 to 0·6 Gm. intravenously); useful in trachoma and staphylococcal infections.—G. R. S. Thomas, L. i./25,1292.

YAWS, acute, generally cured within 3 days by one injection of Novarsenobillon or Galyl.—F. T. Auden, B.M.J. ii./22,83.

In Western Samoa, the standard treatment for yaws is three doses intravenously at one-week intervals.—Per Jl. Trop. Med., Apl. 1/26,27 (Col-Med. Rep. No. 191).

Treatment with '914,' especially insufficient treatment, ***may actually activate latent syphilis.*** After 20 years' trial of Salvarsan, etc., there is absence of unanimity as to the best method of treating syphilis. It is pointed out that some advise ***alternate course of '914' and Bismuth, others simultaneous, others, again, want Arsenic to follow Mercury, and so on.***—J. H. Sequeira, L. i./30,1328.

℗ **Novarsenobenzol Suppositories** (0·10 Gm. in cocoa butter) given to three months' old baby with hereditary syphilis, with good results.—E. G. Melon, per Jl. Trop. Med., Oct. 16/22,334.

℗ **Sulpharsenobenzene.** *Syn.* SULPHARSPHENAMINE, ✱SULFARSENOL (T.M. 434138 Limited use), ✱KHARSULPHAN (T.M. 445499), ✱METARSENOBILLON (T.M. 459,333), ✱MYOSALVARSAN (T.M. 501,517), DI-SODIUM DIOXY-DIAMINO-ARSENOBENZENE-DIMETHYLENE SULPHONATE. P. Ital. V., F.E. VIII., P. Belg. IV.

The Disodium salt of 4 : 4 dioxy-3 : 3-diamino-arsenobenzene-diformaldehyde bisulphite.

$NaOSO_2.CH_2.NH.OH.C_6H_3.As : As.C_6H_3OH.NH.CH_2.O_2SONa.$

This compound, of which the 'proper name' under the **Therapeutic Substances Act, 1925**, and S.R. & O. No. 486, 1927, is **Sulpharsenobenzene**, is a yellow dry powder soluble in water without gelatinous particles visible in the solution. It must comply with tests for toxicity, therapeutic potency and stability detailed in the S.R. & O.

It contains approx. 20% of Arsenic, is soluble, and gives a faintly acid solution.

Dose.—The preparation can be given *hypodermically* or *intramuscularly* in fairly concentrated condition. The following is suggested as a course in primary syphilis for an average adult :—

	Water.		Water.
1st day	0·12 to 0·18 Gm. in 2 to 3 Cc.	19th day	0·54 to 0·6 Gm. in 8 to 10 Cc.
3rd ,,	0·18 ,, 0·3 Gm. ,, 3 ,, 5 ,,	25th ,,	0·6 Gm. ,, 10 ,,
5th ,,	0·30 ,, 0·42 Gm. ,, 5 ,, 7 ,,	40th ,,	and later, Wasserman
8th ,,	0·42 ,, 0·6 Gm. ,, 7 ,, 10 ,,	40th to 60th day,	Arrhenal.
13th ,,	0·48 ,, 0·6 Gm. ,, 8 ,, 10 ,,	61st day,	New Series of injections of Sulfarsenol.

It is supplied commercially in a range of doses.

The preparation is also given intravenously, starting with 0·06 Gm., proceeding with caution (see also Col. L. W. Harrison, *infra*).

The patient should fast for at least 3 hours before the injection and be kept in bed for several hours after. No solid food should be given for 12 hours following, but a little soup may be given after 4 or 5 hours.

It is stated that this is the only Arsenobenzol compound on the market, which can be given into the muscles or subcutaneous tissue without causing great pain. Intramuscular or subcutaneous treatment of syphilis with Arsenobenzol preparations in general said to be better than intravenous.—F. C. Doble, L. ii./20,243. Also used in complications of gonorrhœa, arthritis, rheumatism, hyperkeratosis and epididimytis (especially good in the last-mentioned).—L. i./23,70. See also W. M. Browdy, *ibid.* 158. (Doble uses only 8 to 10 minims of water for 0·2 to 0·6 Gm. injected into the forearm.)

Intramuscularly or subcutaneously in doses as high as 0·6 Gm. in 33% solution, without significant local reaction. End results favourable. Intramuscular injection the method of choice. Relatively high incidence of dermatitis, especially with intravenous injections. In congenital syphilis, as effective as Neoarsphenamin.—Am. Jl. Syph., per Jl. A.M.A. ii./25,1088.

Congenital syphilis treated. Its intramuscular injection not so efficacious as Kharsivan intravenously.—E. Crawford and G. B. Fleming, L. ii./21,700.

Can *not* be recommended for intravenous use. Given subcutaneously, it offers a hope of treating syphilis over long periods without toxic effects.—Col. L. W. Harrison, B.M.J. ii./21,944.

After 3 injections of the drug in the treatment of yaws in a child of 6 an eruption of herpes zoster appeared—possibly due to the Arsenic.—H. Coppin, per Jl. Trop. Med., May 1/23,140.

GONORRHŒAL ARTHRITIS. It is said to 'act like a charm.'—*Dose*, 0·12 Gm. followed in 2 days by 0·18 Gm. intravenously; three injections usually sufficient.—F. C. Doble, L. i./23,1315.

PUERPERAL SEPTICÆMIA well treated subcutaneously, in doses of 0·12 Gm. In some cases 5 or 6 injections (at one-day intervals) of 0·18 Gm. were needed. Intravenously may be preferred in grave cases of septicæmia.—Paris Med., per Jl. A.M.A. ii./25,393.

Good results with Sulpharsenol, 0·06 Gm. to 0·12 Gm., given similarly to Novarsenobenzol in puerperal fever.—L. ii./25,28.

Based on trypanocidal tests, Sulpharsphenamine is considerably inferior to Arsphenamine, and only half as efficient as Neoarsphenamine.—per Jl. Trop. Med., May 15/'25,200.

Dangers of Sulpharsenobenzol injections.—B.M.J.E. ii./26,92.

Death following intravenous administration of Sulpharsphenamine.—J. R. Williams, Jl. A.M.A. ii./29,1096.

℗ Bismuth Arsphenamine Sulphonate, *Syn.* BISMARSEN.

A precipitation compound made by adding Bismuth Potassium Tartrate to Sulpharsenobenzene and pouring the solution, made by means of Soda, into Methyl Alcohol. A yellowish soluble compound with Arsenic content 13% approx. and Bismuth content 24%.

Dose.—Intramuscularly, 0·2 Gm. in 1 Cc. Distilled Water, to which is added 2 minims Butyn 0·2% as local anæsthetic. Initial dose 0·1 Gm. 2 injections weekly for 20 injections. Children over 5 tolerate adult dosage well.

Of value in early syphilis. Toxicity low and reactions benign and controllable.—J. H. Stokes and S. O. Chambers, Jl. A.M.A. ii./27, 1500—1503 For a lengthy account of the substance see N.N.R. 1930. Criticism of the compound.—E. Tytler Burke, L. i./31,1127.

Early syphilis treated with Bismarsen 0·1 to 0·2 Gm. intramuscularly.—Stokes, Miller and Beerman, per B.M.J.E. i./31,116.

℗ Sulphoxyl-Salvarsan. P.G. VI.

SODIUM *p*-ARSENOPHENYL-DIMETHYLAMINOPYRAZOLON-METHYLENESULPHOXYLATE,

$$C_{33}H_{25}O_4N_6As_2S.Na = 774{\cdot}16.$$

Dose.—8 to 12 Cc. intravenously at 2 to 3-weekly intervals. It occurs in commerce only in isotonic solution containing 5% of the Arsenic compound and 12% Lactose. Decomposition occurs on exposure of the solution to light and air.

Used in paralysis frambœsia, syphilis and tertiary malaria.

Notes on History of Arsenobenzol, '418,' and others.—G. Malcolm Dyson, P.J. i./29,199.

W. H. Martindale's paper on Organic Arsenic to the Int. Cong., 1909, and other data on preceding compounds, *see Vol. II.*

℗1 **ATROPINA** (*B.P.* '14). Fr. Cx., U.S. X., F.E. VIII.

$C_{17}H_{23}NO_3 = 289{\cdot}1874.$

℗1 '*Atropine and its Salts and their preparations.*'—See Note to Guttæ Atropinæ Sulphatis.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased to $\frac{1}{16}$, or in acute mania to $\frac{1}{8}$ grain or more. Fr. Cx.—*Maximum dose* in 24 hours 0·001 Gm. ($\frac{1}{64}$ grain) approx.—is generally given internally as sulphate.

An alkaloid obtained from *Atropa Belladonna*, and other solanaceous plants. Generally in acicular crystals, alkaline in reaction.

Soluble.—1 in 560 of water, 1 in 3 of 90% alcohol, 1 in 36 of ether (Fr. Cx. 1 in 25), 1 in 1 of chloroform, 1 in 40 of olive oil, freely soluble in glycerin and oleic acid. Melts (*B.P.* '14) at 114·5° to 115·5° C. Presence of hyoscyamine lowers M.pt.

Incompatible with caustic alkalis and mercurial salts.

Solutions of Atropine Salts left for several hours with Ammonia or Alkali Carbonate and to some extent Bicarbonate, are liable to saponification, forming tropine and tropate.—D. B. Dott, P.J. ii./21,286.

The mydriatic alkaloids, Atropine and Hyoscyamine may be manufactured from *Atropa Belladonna, Datura Stramonium, Duboisia myoporoides* and *Hyoscyamus niger*, and Hyoscine may be obtained from the last two plants. Atropine does not exist as such to any great extent in these plants, but is produced from the Hyoscyamine (its isomer) by the action of Alkali which is used in the manufacture.

Egyptian Henbane, which is available in large quantities, is a fruitful source of the alkaloid.

By the action of baryta water both Atropine and Hyoscyamine split up into Tropic Acid and Tropine; it is, in fact, **Tropyl Tropate.**

Atropine is to all intents an intimate mechanical mixture of *d.*- and *l.*-hyoscyamines which differ in physiological effect. The purest Atropine contains these two constituents in almost precisely equal quantities. This is not the case in the solanaceous alkaloids. Cushny showed that 0·045 mgr. *l.*-Hyoscyamine had the same optic effect as 0·55 mgr. of *d.*-Hyoscyamine, hence the variety *l.* has 12 times the strength of the latter. A sample of Egyptian Henbane (*H. muticus*) yielded at least 83% of its alkaloids as *l.*-Hyoscyamine. 0·5% solutions of this are equal to 2% solutions of Atropine for ophthalmic purposes.—H. R. Jensen, L. ii./16,797.

Tropine may also be combined with other acids, such as salicylic or mandelic acid, to form salts. These salts when treated with diluted hydrochloric acid form a class of artificial alkaloids, to which the generic name of *tropeines* is given. One of these made from the mandelate of tropine is **Homatropine** or oxytoluyltropeine (*q.v.*)

Antidotes.—Stomach pump and emetics followed by stimulants, hot coffee, morphine hypodermically $\frac{1}{3}$ grain every two hours or pilocarpine nitrate $\frac{1}{2}$ grain, hypodermically. Electricity, heat, and artificial respiration.

Pharmacological antagonism between Atropine and Pilocarpine appears to depend on mass action rather than upon actual amounts injected into the animals.—A. R. Cushny, Jl. Ph. Exp. Therap., 1915, 6, p. 439.

Atropine Sulphate 0·02 Gm. in 1% solution (2 Cc.) given in error *intravenously* instead of Tartar Emetic to a bilharzia patient. No antidote was given yet the patient was not seriously affected.—W. B. Haddad, L. i./22,155.

Uses.—Atropine and its salts are used for ophthalmic purposes to dilate the pupil and paralyse accommodation.

Given internally or hypodermically, they are antagonistic to opium and morphine, Calabar bean and physostigmine, jaborandi and pilocarpine, aconite and aconitine, and hydrocyanic acid. Physiologically, whilst Atropine acts as a "stimulant" to a large part of the central nervous system, it paralyses many of the nerves. It lessens the perspiration, especially the night sweats of phthisis, and has been thought to stop the flow of milk and saliva, most of the secretions, but not the amount of the urine.

It is also injected to relieve pain in sciatica and is given to check bed wetting, and to relieve spasm of pain of urinary calculus, cystitis, and prostatitis. Relieves bronchial spasm, whooping cough and asthma.

Hypodermically prior to chloroform it is of value as an antidote to the cardio-inhibitory effects of the anæsthetic.

Morphine better than Atropine as a pre-medicant. Atropine has actually a stimulant effect and may facilitate onset of shock instead of delaying it.—R. J. Clausen, B.M.J. ii./31,377.

To diminish gastric secretion give Atropine in small dose in a large volume of water, on an empty stomach. Experimental proof.—T. Izod Bennett, B.M.J. i./23,366.

Typhoid Diagnostic, vide Vol. II.

Gas Poisoning.—Animal experiments (rabbits) showed that doses by injection of 2·5 mgr. to 4 mgr. were most satisfactory.

Its administration tends to cure inebriety.—Owen Lankester, B.M.J. ii./05,106.

℞ **Atropine and Strychnine injection treatment for inebriety:—**

First week, Atropine $\frac{1}{100}$ grain, with Strychnine $\frac{1}{60}$ grain *t.i.d.*
Second ,, ,, $\frac{1}{60}$,, ,, ,, $\frac{1}{30}$,, ,,
Third ,, ,, $\frac{1}{50}$,, ,, ,, $\frac{1}{30}$,, ,,
Fourth ,, ,, $\frac{1}{100}$,, *sine* Strychnina.

together with a mixture of Cinchona Extract, Sal Volatile, and Spirit of Chloroform thrice daily. A little Capsicum may also be added.

℗ **Mistura Antidipsomania Form No. 2.**

Dose.—½ ounce (**15 Cc.**)

Concentrated Liquors of Commerce of Cinchona and Gentian 10 minims, of Capsicum ½ minim, Solution of Strychnine Nitrate (4 grains to the ounce) 1 minim, of Atropine Sulphate (1 grain to the ounce) 1 minim, Glycerin 1 drachm, Water to ½ ounce, has been found of great value with the Strychnine and Atropine injections, gradually diminished in strength.

In the knowledge of the writers Liquor Strychninæ and Liquor Atropinæ Sulphatis up to 8 minims respectively internally and then gradually reducing, together with a cinchonine tonic, worked wonders,

but recently doubt as to the efficacy of Atropine has been expressed. It is of little use in the acute stage—when help is most wanted.

On commencing treatment give a general tonic and stomachic to reduce physical craving for Alcohol, *e.g.*, the following mixture 6 times daily: Atropine Sulphate Solution ½ m., Strychnine Hydrochloride Solution 1 m., Compound Tincture of Cinchona ½ drachm, Glycerin ½ drachm, Compound Infusion of Gentian Root to ½ ounce. After 4 days this is replaced by the following every 2 hours: Liquid Extract of Cascara 10 m., Compound Tincture of Cinchona ½ drachm, Aloin $\frac{1}{16}$ grain, Strychnine Hydrochloride Solution 3 m., and Compound Infusion of Gentian Root to 1 drachm. The Strychnine is omitted after 1 week. Colloidal Gold (2 Cc. daily) is also given in equal doses thrice daily, after meals, continued for 3 weeks.—P. Bonsfield, L. ii./25,1150.

For further Inebriety Treatment see *Alcohol—Inebriety.*

References to use of Atropine and its Salts.

CHOLERA successfully treated by hypodermic injection of Atropine. Originally advised by Sir L. Brunton to lessen vomiting. $\frac{1}{100}$ grain doses tried morning and evening. Results of value.—Sir L. Rogers, L. ii./15,222.

COLDS can be aborted by dose of $\frac{1}{150}$ to $\frac{1}{60}$ grain (Sulphate), to be dissolved in a tumbler of water and the whole sipped in the course of an hour, to be repeated next day if necessary.

DIPHTHERIA, CARDIAC DEPRESSION in, treated by Atropine Sulphate $\frac{1}{100}$ grain, Strychnine Hydrochloride $\frac{1}{100}$ grain, Adrenalin Solution (1 in 1,000) 5 minims, Water to 10 minims, hypodermically every four hours.—B.M.J. i./12,535.

EPIDIDYMITIS prevented by hypodermic or Suppository use (1/75 grain in each) of Atropine. Useful in treatment of gonorrhœa.—W. Harrison and C. H. Heald, from a Military Hospital Report.

HÆMOSTATIC ACTION is obtainable from full doses of Atropine with development of toxic symptoms—dry mouth, flushed face, and dilated pupil. Successful in active and passive arterial and capillary, traumatic and hæmophilic forms of bleeding.—Waugh.

In PULMONARY HÆMORRHAGE in tuberculosis Atropine Sulphate $\frac{1}{100}$ grain hypodermically at intervals of 4 or 2 hours according to circumstances—acts no doubt by lowering pressure in pulmonary vessels.—J. W. Allen.

HEART BLOCK.—In cases of high degree not due to organic causes, Atropine is often effective in reducing the block. Not successful in cases of complete organic block, nor does it appear to lessen either frequency or severity of the syncopal attack. Antisyphilitic treatment (Mercury, Potassium Iodide, Salvarsan) has been extensively tried in view of the fact that many cases of block are due to gumma of the bundle—results on the whole disappointing.—Pr., Nov., '12/655.

Small doses of Atropine slow the heart, whereas large doses cause acceleration. Small doses increase heart block, but large doses tend to remove it. Individuals vary considerably in reaction, but 1/100 gr., as a rule, slows the heart.—B.M.J.E. i./25,11.

Infants may receive Atropine in Alcoholic solution, *e.g.*, 0·1 mgr. (max. initial dose). Most infants bear it well, one 8 months old being given mgr. of Atropine Sulphate daily without harm. It often has a tranquillising effect in excessively nervous children and may arrest habitual vomiting and pylorospasm; eczema and exudative diathesis is sometimes influenced favourably. Best given before meals.—Per Jl. A.M.A. ii./25,938. But may cause severe reaction with hyperpyrexia and abdominal distension. Fever reduced by hydrotherapy. No harmful after-effects. Dose should be increased slowly. —G. F. Munns, Jl. A.M.A. ii./29,171.

IRITIS is to be treated locally by dilating the pupil and keeping it dilated. Henderson uses Atropine 1% with Cocaine 0·5% Ointment for the first three days every four hours. Then the Cocaine is eliminated, Atropine being used alone three or four times a day. Hot fomentations and leeches to temple beneficial.—B.M.J. i./09,1221.

LABOUR. Atropine appears to stimulate contractions. It certainly has no inhibitory action.—A. W. Bourne and J. H. Burn, B.M.J. ii./30,87.

MANIA, ACUTE. Very large doses cause sleep.—R.

MIGRAINE well treated by Liquor Atropinæ Sulphatis 1 to 3 minims three times daily after meals.—H. D. O'Sullivan, B.M.J. i./23,18.

PYLORIC STENOSIS.—Begin with small dose of 3 or 4 drops of 1 in 1,000 watery solution of Atropine Sulphate half an hour before feed, increased till child is receiving 35—45 drops in 7 or 9 drop doses five times daily. Results best perceived when given over a period of weeks.—J. L. Meagher, B.M.J. ./26,89.

SEASICKNESS.—Atropine hypodermically 1/50 to 1/30 grain. As preventive /60 grain on embarking is efficacious.—Pres., May, 1920.

TUBERCULOSIS.—Atropine in doses of $\frac{1}{100}$ to $\frac{1}{50}$ gr. at bedtime makes sweating impossible.—Dixon, Pr. xc., 1.

℞ **Atropinæ Salicylas** $C_{17}H_{23}NO_3.C_7H_6O_3 = 427{\cdot}2342$.

Dose.—$\frac{1}{60}$ grain (**0·001 Gm.**).

A deliquescent powder, stated to be superior to the sulphate as more rapid in effect.

℞ **Liquor Atropinæ Salicylatis.**—Atropine $\frac{1}{2}$ grain, Salicylic Acid $\frac{3}{4}$ grain, Water 1 ounce.

℞ **Atropinæ Sulphas** (*B.P.* '14). P.G. VI., P. Helv., P. Jap., U.S. X. $(C_{17}H_{23}NO_3)_2H_2SO_4 = 676{\cdot}4804$. P.G. VI. and FR. CX. $+H_2O$. Ph. Ned. V. $2H_2O$. F.E. VIII., P. Belg. IV. and P. Ital. V., $1H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**) increased to $\frac{1}{16}$, or in cases of acute mania $\frac{1}{8}$ grain. FR. CX. has maximum dose in 24 hours $\frac{1}{32}$ grain approx.; P.G. VI. $\frac{1}{64}$ grain; P. Belg. $\frac{1}{20}$ grain.

Opaque white minute crystals or granules, soluble 1 in less than 1 of water.—W. H. M. Commercial samples melt mostly at 186° to 187° C., P. Jap. 180° C.

Incompatibles.—Bromides, Iodides. Quinine Hydrochloride is incompatible, but the acid Hydrochloride does not precipitate in reasonable dilutions. See also under Atropine.

On heating, aqueous solutions of the Sulphate are liable to be hydrolysed to Tropine and Tropic Acids. The Chloride, Nitrate and Phosphate are stable.—B.C.A., 1926, A184.

Uses.—See Atropine (base).

℞ **Tablets** $\frac{1}{100}$ grain (**0·0006 Gm.**).

Ptyalism is relieved by taking Atropine Sulphate $\frac{1}{300}$ grain in water every 4 hours.—Beddoes.

℞ **Granules de Sulphate d'Atropine.**—FR. CX. contain 1 mgr.

℞ **Compound Asthma Fluid** (**Martindale**).

This preparation is only supplied on a prescription by a qualified medical practitioner.

It contains, amongst other ingredients, a small proportion of atropine, and is found of considerable value in preventing attacks of asthma. A few "blows" from a fine spray will be found sufficient to ward off an attack. A special **Spray** is made for the fluid.

It is prepared in 3 strengths, designated 'A,' 'B' and 'C,' respectively. We find by experience that the 'A' strength is well tolerated by all sufferers, the 'B' being double strength of 'A' in Atropine is often more effectual. The 'C,' double strength of 'B,' is used by confirmed asthmatics and affords relief.

The use of atropine in asthma was first advocated by Trousseau. Its employment may effect permanent relief.

℗ **Lamellæ Atropinæ, Discs of Atropine** (*B.P.* '14).
Contain $\frac{1}{5000}$ grain of the sulphate in each, for dilating the pupil; others containing ℗ $\frac{1}{500}$ (R.O.H.) paralyse the accommodation. Also prepared containing ℋ ℗ Atropine Sulphate $\frac{1}{1000}$ grain combined with Cocaine Hydrochloride $\frac{1}{200}$ grain and ℋ ℗ Cocaine $\frac{1}{200}$ with Atropine $\frac{1}{5000}$ grain. (R.O.H. has ℋ ℗ Atropine $\frac{1}{200}$, Cocaine $\frac{1}{100}$ grain.)

℗ **Hypodermic Tablets** contain $\frac{1}{200}$, $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$, and $\frac{1}{50}$ grain in each, also ℋ $\frac{1}{120}$ grain combined with Morphine Sulphate $\frac{1}{2}$ grain, and Atropine Sulphate $\frac{1}{200}$ grain combined with Morphine Sulphate $\frac{1}{4}$ grain, *vide* also Morphine Sulphate.

℗ **Sterules, Hypodermic,** contain $\frac{1}{100}$ grain in 15 minims (1 Cc.). The strength of ℗ **Injectio Atropinæ Hypodermica, B.P.C.** is $\frac{1}{100}$ grain in 8 minims. *Dose.*—2 to 8 minims.

℗ **Liquor Atropinæ Sulphatis** (*B.P.* '14).
Dose.—$\frac{1}{2}$ to 1 minim (**0·03 to 0·06 Cc**)., or more.
Strength 1%. Should be directed to be freshly prepared.

℗ **Guttæ Atropinæ Sulphatis, R.O.H.,** $\frac{1}{4}$, $\frac{1}{2}$, 1, or 2%.
St. Th. H. has 0·5 or 1%; U.C.H. 0·5 or 1%. St. M.'s H. 0·5%.
A simple solution of Atropine is a preparation of Atropine, but a compound of several substances to which a small percentage of Atropine has been added, may more properly be regarded as a "preparation or admixture containing Atropine"—Glyn-Jones.

℗ **Guttæ Atropinæ cum Zinco, R.O.H.**—Atropine Sulphate 0·5 or 1, Zinc Sulphate 0·25 Sterilised Distilled Water to 100.

Chalk's Bottles with rubber cap on hollow stopper are convenient for eye drops and mostly employed. They are supplied in colourless and amber glass. Metal cases, sterilisable for same, are durable, and suitable for travelling.

Eye Rods have (i) pointed, (ii) flattened or (iii) bulbous ends (Lang's) for ointments or solutions.

ℋ ℗ **Guttæ Atropinæ cum Cocaina,** St. Th. H.
Atropine Sulphate 1, Cocaine Hydrochloride 2, Sterilised Distilled Water to 100.

℗ **'Sterules,' Ophthalmic, of Atropine Sulphate** Solution 1% are made; also of ℋ ℗ **Atropine Sulphate** Solution $\frac{1}{2}$% with **Cocaine Hydrochloride** $2\frac{1}{2}$%.

℗ **Guttæ Atropinæ et Quininæ** (Liverpool Eye and Ear Infirmary). Atropine Sulphate 4 grains, Quinine Sulphate (bi-sulphate) 4 grains, Distilled Water 1 ounce.

℗ **Glycerinum Atropinæ.** St. Th. H. has Atropine Sulphate $25\frac{1}{2}$ grains dissolved in Water 5 ounces, add Compound Tincture of Lavender 100 minims, and made up to 1 pint with Glycerin. This is more cleanly than Glycerinum Belladonnæ and does not stain. It replaces Glycerinum Belladonnæ. U.C.H. is similar.

The resinous matter in the Compound Tincture of Lavender deposits. We found the following to keep better: Atropine Sulphate $127\frac{1}{2}$ grains, Water 25 ounces, Spirit of Lavender 2 minims, Spirit of Rosemary 2 minims, Cinnamon Oil 1 minim, Magenta Solution *q.s.*, Alcohol 90% 1 ounce, Glycerin to 100 ounces.

℞ **Linimentum Atropinæ.**
Atropine 1 (more or less, if ordered), Oleic Acid 15, Castor Oil 15, Oil of Lavender 1, Alcohol (90%) *q.s.* to 100.
In lumbago and other rheumatic affections is very serviceable used with gentle friction ; it is readily absorbed.
St. Th. H. has Atropine Sulphate $38\frac{1}{4}$ grains, Compound Tincture of Lavender 100 minims, Methylated Spirit to 1 pint. Does not stain. Is the same strength (0·375% w/v) in Atropine as Belladonna Liniment *B.P.* '14.
Linimentum Atropinæ et Chloroformi, St. Th. H.
5 parts of the latter with 1 of Chloroform.

℞ **Oleum Atropinæ.**
Atropine 1, Castor Oil *q.s.* to 100. Heat to dissolve (R.O.H. 4 grains in 1 ounce). Forms a stable solution, *vide* Alkaloidal Oils, under Oleum Ricini.

℞ **Pessaries of Atropine** are prepared (weight 120 grains) with gelatin mass or at times with oil of theobroma, containing generally $\frac{1}{200}$ grain of the alkaloid in each.

℞ **Pilula Atropinæ,** $\frac{1}{2000}$, $\frac{1}{1200}$, $\frac{1}{1000}$, $\frac{1}{800}$, $\frac{1}{600}$ grain in each.
Taken at night, to check sweating. May cause dryness of the throat.

℞ **Pilula Atropinæ** $\frac{1}{2000}$ grain, **Arsenici** $\frac{1}{1000}$ grain, **et Quininæ** $1\frac{1}{2}$ grains.
Quinine Sulphate 150 grains, Arsenious Acid Trituration 10 grains, Atropine Sulphate Trituration 5 grains with Milk Sugar and Acacia *q.s.* to make 100 pills. For catarrhal cold, if taken in early stage, one every 3, 4, or 6 hours, " nips it in the bud."

℞ **Unguentum Atropinæ,** R.O.H., Atropine 2, 4 or 8 grains, Soft Paraffin to 1 ounce. Dissolve Atropine in Chloroform and add to melted Paraffin at not exceeding 61°C. ℞ **Unguentum Atropinæ cum Acido Borico,** R.O.H., was Atropine 1, Powdered Boric Acid 15, Soft Paraffin to 100 ; ℥ ℞ **Unguentum Atropinæ cum Cocaina,** R.O.H., has Atropine 4 grains, Cocaine 8 grains to ounce. Proceed as under Unguentum Atropinæ. ℞ **Unguentum Hydrargyri Oxidi Flavi cum Atropina,** R.O.H., has Yellow Mercuric Oxide 4 grains, Atropine (dissolved in Chloroform) 2 or 4 grains, Soft Paraffin to 1 ounce. ℞ **Unguentum Iodoformi cum Atropina,** R.O.H., Atropine 2 grains (in Chloroform). Add to melted Soft Paraffin 1 ounce at 61° C. Stir until cold and add Iodoform 60 grains.

℞ **Atropinæ Methyl-Bromidum.** *Syn.* MYDRIASINE.
$C_{17}H_{23}O_3NCH_3Br = 384{\cdot}1318$.
Dose.—$\frac{1}{64}$ grain to $\frac{1}{32}$ grain (**0·001 to 0·002 Gm.**).
An addition product of Methyl-bromide to the alkaloidal base.
White crystals soluble in water 1 in 1 easily.

Uses.—Internally similar to those of atropine. Subcutaneously in croupous pneumonia, pleuritis sicca and appendicitis ; dyspepsia with pyrosis (with sodium bicarbonate), and epilepsy (with bromide). As effect passes off rapidly it is useful in $\frac{1}{2}$ to 2% solution with cocaine hydrochloride 1% for dilating the pupil in suspected iritis to ascertain whether adhesions exist.

℗ **Homatropine,** $C_{16}H_{21}NO_3$=275·1718.

Manufacture.—Heat Atropine Mandelate seven days on the water bath with dilute Hydrochloric Acid. Precipitate the clear liquid with Potassium Carbonate and shake out the oily base with Chloroform. Remove the latter and convert the base for further purification into the Picrate. Dissolve the picrate in water *q.s.* to retain it in solution in the cold. Add excess of Potassium Carbonate and shake out with Chloroform. The base is difficult to obtain crystalline.

℗ **Homatropine Hydrobromide,** ℗ **Hydrochloride,** $C_{16}H_{21}NO_3.HCl$ =311·6366 and ℗ **Salicylate** $C_{16}H_{21}NO_3.C_7H_6O_3$ = 413·2186 are readily obtainable in minute granular white crystals. Their solutions act as quick and decided local mydriatics, the pupil rapidly returning to its normal condition. The mydriatic action commences in ¼ to ½ hour, and disappears in from 6 to 24 hours. The salts are freely soluble in water; Homatropine (the base) is nearly insoluble in water, but soluble in oils, or 1 in 100 of soft paraffin.

Dose. of each.—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0·0008 to 0·003 Gm.**).

Action in checking night-sweating is said to be inferior to atropine and picrotoxin. Large doses may cause, like atropine, staggering gait, and delirium in children. Homatropine slows the heart beats and renders them irregular in force and rhythm.

℗ **Oleum Homatropinæ.** A 2% solution in Castor Oil, dissolved by heat (*using the smallest amount possible*). Powder the Homatropine first.

℗ ℗ **Oleum Homatropinæ cum Cocaina** R.O.H., contains in addition 2% of Cocaine.

Homatropine Oil is used in preference to Atropine in estimating lesions of refraction; inconvenience of mydriasis may be partially overcome by Eserine. These oily solutions are not washed out by the tears.

℗ **Homatropinæ Hydrobromidum.** (*B.P.* '14). **U.S. X., P.G. VI. P. Helv., P. Svec.** and **P. Jap., P. Belg. IV., P. Ital. V., F.E. VIII.** $C_{16}H_{21}NO_3HBr$=356·0956.

Dose.—$\frac{1}{80}$ to $\frac{1}{20}$ grain (**0·0008 to 0·003 Gm.**). (U.S. *av.* $\frac{1}{120}$ grain). In minute trimetric crystals, soluble 1 in 6 of Water.

℗ **Guttæ Homatropinæ R.O.H.,** 1 or 2%.

℗ ℗ **Guttæ Homatropinæ cum Cocaina, R.O.H.**

Homatropine Hydrobromide 1 or 2, and Cocaine Hydrochloride 2 in Water 100.

Menthol 2 grains, Methyl Salicylate 2 minims, and Tincture of Iodine 2 minims, to the pint of distilled water as an antiseptic solvent of Homatropine and other alkaloidal salts for eye work.—N. Bishop Harman, B.M J. ii./16,178. See also *ibid.* i./20,599.

℗ **Sterules (Ophthalmic) of Homatropine Hydrobromide Solution,** 1% are prepared, also

℗ ℗ **Sterules (Ophthalmic) of Homatropine Hydrobromide Solution** 1% with **Cocaine Hydrochloride** 2½ %.

℗ **Injectio Homatropinæ Hypodermica,** 1 in 120, is used.

Dose.—1 to 6 minims (**0·06 to 0·4 Cc.**).

Tablets, Hypodermic, contain $\frac{1}{200}$ grain.

(**Sterules of Distilled Water,** containing 5 Cc. are useful for ssolving hypodermic tablets in the syringe.)

Lamellæ Homatropinæ (*B.P.* '14) contain $\frac{1}{100}$ grain (**0·0006 Gm.**) of Homatropine Hydrobromide.

℞ **Lamellæ Homatropinæ et Cocainæ** (**Gelatin Ophthalmic Discs**) contain of each $\frac{1}{50}$ grain (**R.O.H.**) for paralysing the accommodation, also made $\frac{1}{200}$ grain of each.

Methyl-Atropine Nitrate. $C_{16}H_{19}NO_3.CH_3.CH_3HNO_3=366·2188$.
Dose.—$\frac{1}{60}$ to $\frac{1}{24}$ grain (**0·001 to 0·0025 Gm.**).

Manufacture.—Although the patent specification mentions the use Methyl Nitrate, to be employed by direct addition in presence of Methyl cohol at a temperature of 110° C. in a closed vessel for 2 hours, we believe at the more rational procedure would be to heat the alkaloidal base with ethyl Iodide in Methyl Alcohol Solution to 100° C., forming Atropine-Methyl-dide, and then to convert this into Hydroxy-Methyl-Atropine by means of shly precipitated Silver Oxide. Finally prepare the nitrate in the usual anner.

A white odourless powder, M.Pt. 163° C., soluble in water, a werful mydriatic, and less poisonous than Atropine. 1% or 2% lution dilates the pupil after 25 minutes, the maximum is reached 50 minutes. Dilatation persists for 12 hours.

AURUM.

Au=197·2.

For dental fillings the metal is employed in ' cohesive ' and ' non-cohesive ' rm.

uri Bromidum. $AuBr_3=436·948$.
Dose.—$\frac{1}{64}$ to $\frac{1}{10}$ grain (**0·001 to 0·006 Gm.**), increased to $\frac{1}{5}$ grain, ell diluted.

A brown powder, soluble in water 1 in 75.

Uses.—In epilepsy, hysteria and migraine, also in nervous yspepsia, amenorrhœa, and chronic Bright's disease. Epileptics eated with it may remain for years free from attacks. Useful in coholic neurasthenia; the ' Gold Cure ' combined with Hyoscyamine (or Atropine) and Strychnine treatment has proved of value.

ee **Colloidal Gold.**

Liquor Auri et Arsenii Bromidi.
Auric Bromide $1\frac{1}{2}$ grains, Oxybromide of Arsenium 3 grains [or emens' Solution (*q.v.*) 192 minims], Distilled Water to 1 ounce. *Dose.* -5 to 10 minims (**0·3 to 0·6 Cc.**).

quor Auri et Hydrargyri Bromidi.
Auric Bromide, Mercuric Bromide, of each $1\frac{1}{2}$ grains, Distilled ater to 1 ounce. *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**) has been ed in neurasthenia, epilepsy, syphilis, and acne.

uri Tri-Chloridum (Purum), $AuCl_3=303·571$. Contains about 65% Au. and is official in Fr. Cx. and the Portuguese Pharm. A brown variety is also made. It contains xH_2O.

Auri Tri-Chloridum Acidum. *Syn.* **Aurochloric Acid.**
$AuCl_3.HCl.xH_2O$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**), increased to $\frac{1}{4}$ grain. In brown crystals; contains about 50% of gold. Is deliquescent and easily soluble in water. Has been given as an alterative in phthisis.

Auri et Sodii Chloridum. **Gold and Sodium Chloride.**
$AuCl_3.NaCl,2H_2O=398·0562$. (Fr. Cx.).

Dose.—$\frac{1}{30}$ to $\frac{1}{12}$ grain (**0·002 to 0·005 Gm.**), increased to $\frac{1}{2}$ grain in a pill with kaolin ointment. *Hypodermically,* $\frac{1}{12}$ grain (**0·00** **Gm.**) doses have been given.

Sterules of this Gold and Sodium Chloride contain 1/20 grain (**0·003 Gm.**) and upwards.

This is the ordinary **Commercial "Chloride of Gold,"** *e.g.*, the "Scales" Brand, as largely used in the past for toning in photography. An orange-yellow crystalline, deliquescent powder, soluble 1 in 2 of water, only partially soluble in alcohol. The Fr. Cx. preparation contains a *molecule of each salt* combined, yielding approximately 50% of metallic gold. It is sometimes used as a caustic, and given internally for syphilis. Combined with strychnine it is useful in neurosis.

Leprosy and the eye affections associated, have been treated with this Chloride of Gold in 1/20 grain doses.—T. F. G. Mayer, Lagos.

According to Heimburg and Yii, China Med. Jl. (Sept.' 30), Gold has its place in treatment, but is of doubtful curative value. With a combination of Chaulmoogra Oil subcutaneously and Gold intravenously the effect might be comparable to the use of Arsenic and Mercury, or Bismuth, in syphilis.

In these eye affections of leprosy, not only in conjunctivitis but in the deeper layers, even to iridocyclitis, the compound acts like a specific. Two to four doses of the 1/20 grain intravenously at 10-day intervals completely healed 5 cases. Larger doses seem unnecessary. Many lepers' eyes might be saved.—Russell L. Robertson, Garkida, Nigeria.—1931.

Lupus Erythematosus treated by Gold salts intravenously. Of the Chloride, 1 Cc. of 0·1% once a month, increased to 5 Cc. and if necessary to 10 Cc. Results fully equal to those from complex compounds. The latter had annoying sequels not seen with Gold Chloride. The Chloride seems at least equal in therapeutic effect to the complex bodies. The 0·1% is strongly bactericidal and does not need boiling.—B.M.J.E. ii./30,46.

Locomotor Ataxia.—$\frac{1}{10}$ grain in pill form seems to have some power of retarding the degenerative process; arsenic $\frac{1}{20}$ grain in solution thrice daily is also believed to act in the same way. Alternate monthly courses of each advocated.—Whitla, Pract. Med.

Cirrhosis of the kidney has been well treated by Chloride of Gold; said to improve character of the urine, to diminish the frequency of nocturnal micturition and to increase general well-being.—Tirard, Med. Treatment.

Commercial "Chloride of Gold and Sodium" consists of **Auri et Sodii Chloridum** (50% Au) mixed with an equal weight of sodium chloride. It contains, therefore, 25% Au approximately.

℗ **Auri et Potassii Cyanidum.** $KAu(CN)_2+2H_2O=324·3472·$
Dose.—$\frac{1}{64}$ to $\frac{1}{3}$ grain (**0·001 to 0·02 Gm.**).—*with caution.*
White crystalline soluble powder.

In lupus and in syphilis has been used. Intravenously the dose was found be 0·02 to 0·05 Gm. for adults, and 0·0005 to 0·03 Gm. for children. To the se in 1% solution 50 Cc. of Normal Saline Solution are added, and given ery second or third day to the extent of 12 injections. The injection is d to be quite painless. After 48 hours a local reaction occurs. *Caution* :— e doses seem large. We have no personal knowledge of them.

***Sanocrysin** (T.M. 448683). *Syn.* *CRISALBINE. (T.M. 461294). DIUM AUROTHIOSULPHATE, $Au(S_2O_3)_2Na_3$=490·431.

A double Thiosulphate of Gold and Sodium.

Dose.—Intravenously initially 0·01 Gm., gradually increasing tolerated and no violent reaction, to 0·015 Gm. per kilo weight, , a maximum of 1 Gm. per average adult's weight of 10 stone. lutions must not exceed 5% strength. May also be given intramus- arly (3% solution) if intravenous method is inconvenient, *e.g.*, children.

This treatment of tuberculosis is due to Prof. H. Moellgaard.— M.J. i./25,643. It is stated to be indicated in cutaneous, glandular; d early pulmonary cases.

As with Krysolgan, a few years previously, there has been the same wnward graduation of dosage in response to poisoning cases. stead of 1 and 1·5 Gm., initial doses of 0·125 and even 0·05 Gm. ve been given intravenously. No doubt many of the effects are e to Gold poisoning.—L. i./25,934.

The M.R.C. made two Reports on its use. Early cases of open infection of lungs showed some improvement. More advanced cases did not stand the atment well—some were made worse.

One death recorded in 140 cases (2 deaths in 30 in the first Report). Risk nains. Need for extreme care. Patients must be in bed under close ntrol. There is definite hope of a drug along these lines.—B.M.J. i./25,735 ; 26,158 ; L. ii./26,181.

The 30 cases in the M.R.C. Report might have shown better results with berculin. To discover the pyschic effect of a new remedy, a Normal Saline l Phenol solution was labelled " New Tuberculin, O.K.," deceiving staff and tient. After a series of injections with 8 patients, 4 claimed (and showed) finite improvement, 2 were uncertain and 2 definitely negative !—W. C. wler, L. i./25,893.

The treatment shortens the duration of lesser degrees of tuberculosis, and here sufficient tissue with vital energy remains, gives good results in more ronic cases. It is extremely dangerous in the more severe forms—it pro- les a last chance, which, failing, might accelerate death. Early cases of ndular and pulmonary tuberculosis in children well treated, but later ges less amenable. Local application in surgical tuberculosis beneficial.— ader, B.M.J. i./25,176.

Prof. O. Bang states that 1 in 3,200 solution does not interfere with growth tubercle bacilli.—B.M.J. i./25,1096.

Effective in tuberculosis of the lungs of less than one year's standing, but older cases treatment is uncertain.—Knud Faber of Copenhagen, L. ii./25,62.

Favourable report on 8 cases.—Prof. S. L. Cummins, L. ii./25,299.

Small doses as good as large ones. Use of serum abandoned. Discussion by. Soc. Med.—B.M.J. i./26,100.

The salt penetrates the lipoid substance of the bacillus and carries the gold to its body, killing and dissolving it with immunizing effect.—Mary F. nnetti, B.M.J. i./26,945.

Sir Almroth Wright says there is no evidence that the compound as a chemo-rapeutic agent is able to destroy the bacillus.—B.M.J. i./26,102.

With Sanocrysin in the dilution of 1 *in* 2,500 *in human blood tubercle grows st as well as when none is present.—Prof. Fleming, B.M.J.* i./31,267.

Eleven cases. More rapid improvement than could be obtained by any her method. Unlikely to prove useful in lupus and renal tuberculosis.— of. T. R. Elliott, B.M.J. i./26,486 ; L. i./26,126 ; see also *ibid.*, 134.

Sanocrysin Research Committee of Japan conclude it is not specific a does not directly destroy the bacillus, but may on occasion be a stimulant the stationary proliferative type of pulmonary tuberculosis. May cau serious damage to tissues. Laryngeal and intestinal tuberculosis unsuit for treatment.—B.M.J. ii./28,349.

No patient who has had the treatment should be exposed to bright sunligh as it may result in lilac-coloured pigmentation of the parts exposed.—G. Beaumont, B.M.J. ii./28,819.

Intravenously once or twice weekly 0·1 Gm. in 2 to 5 Cc. water an efficacio and apparently safe remedy for intractable tuberculous dermatosis.—Whit house and Bechet, Arch. Derm. and Syph., 1927; per Pres., Oct., '28,341.

Beneficial for cases of fairly good physique and no abdominal tuberculosis.- F. Heaf, L. i./29,1138.

Improvement under.—B. R. Clarke and H. G. K. Haddick, L. i./29,714,87

Favourable results.—L. ii./29,76.

Lupus erythematosus.

Almost specific. Initial dose 0·05 Gm. in 2 Cc. water, and second injectio 5 to 7 days later—injections continued at weekly intervals.—Per Jl. A.M. i./27,1111. Larger doses not advised.

In 30 cases there were 27 clinical cures and improvement in the remainde *Dose.*—0·025 Gm. in 2 Cc. water once weekly intravenously, increased 0·005 Gm. weekly, provided there are no toxic symptoms, up to a maximum 0·1 Gm.—A. J. Markley and O. S. Philpott, Jl. A.M.A. ii./29,235.

Toxic Reactions and Deaths.

The three principal reactions—fever, rash, and albuminuria—act as guid to conduct of case. In obviously difficult cases preliminary serum treatme is necessary to avoid albuminuria. *Nine patients died as direct result treatment.* All slight cases which became symptom-free under treatme reacted violently. It is only suitable for hospital practice.—B.M.J. i./25,27

The toxic effects are the same in tuberculous and non-tuberculous subject They are due to metal poisoning and not cleavage products from the bacill No demonstrable specific action in tuberculosis.—E. Le Blanc, M.m.W., Mar 12/26,444; per Pres., Aug., '26,297.

Re metallic intoxication.—American criticism, see L. i./25,501; see als *ibid.*, 239,556.

May even make difference between life and death, but physician should b conversant with its use.—C. A. Sprawson, I.M.G., Dec., '26,588.

Retards growth of tubercle bacillus in cultures in 1 part in a million (Moellgaard said 1 in 100,000.) Animal experiments suggestive but no conclusive.—W. E. Dixon, B.M.J. i./25,815. *These statements are not supporte by other workers.—v. antea.*

Drugs in tuberculosis reviewed.—Cerium, Copper compounds, etc Krysolgan and Sanocrysin.—W. E. Dixon, B.M.J. i./25,813.

Dangers greatly exaggerated. With care rarely causes harm. Has a apparent specific effect on the tuberculous process. Best results in early an pneumonic type.—A. Morland and E. Zimmerli, L. i./27,652.

Poor results due to low dosage—K. Secher, L. ii./31,1344. *See also ibid,* 1348,1362.

Pl ✱ **Krysolgan** (T.M. 439288).

The Sodium salt of 4-amino-2-auromercapto-benzene Carboxylic Acid. Contains 50% Gold.

Dose.—Initially 0·0001 to 0·001 Gm. to establish tolerance, increased to 0·01 Gm. at intervals of 2—4 weeks.

Prevents the growth of the tubercle bacillus in 1 part in a million. Anima results not promising, but clinical results hopeful and inspiring.—W. E Dixon, B.M.J. i./25,815. Severe reactions from.—B.M.J.E. i./22,77.

Pulmonary tuberculosis.—Review of methods of treatment including gol and other heavy metals and colloidal calcium. Reactions very similar t those with tuberculin.—C. Riviere, B.M.J. i./25,771.

A. Cowan Guthrie claims to be the originator of the Colloidal Gold treatmen of tuberculosis, having introduced '**Auro-cyanase,**' a double colloidal cyanid of Gold and Potassium, which was found effective in all stages of the disease

e preparation is given subcutaneously over the deltoid, the administration eucocytic extract before, during and after the injections preventing the eral reaction which otherwise occurs.—B.M.J. i./26,284.

upus Erythematosus treated by Krysolgan.—H. C. G. Semon, M.J. ii./27,258.

lmost specific, and, with ordinary care, not dangerous. Reports of nine es—six cured.—J. H. T. Davies, B.M.J. i./29,12.

Death has followed an injection of 0·001 Gm. in a case of lupus erythematosus. Therapeutic value of Gold compounds. Lupus cases improved.—B.M.J. o,592.

***Solganal** (T.M. 486956). Described as the di-Sodium deriva- e of 4-amino-methyl-sulphinic Acid-2-auro-mercaptobenzene-1- phonic-Acid. Contains 36·5% Gold.

eprosy treated with Carbon Dioxide pencils and this gold preparation.— ./29,874.

***Lopion** (T.M. 461073.) (' G. 2949'.) The Sodium salt of the Gold ivative *a*-allyl-*b*-4-carboxy-phenyl-thiourea. A water-soluble npound containing 40% Gold.

Dose.—Initially intravenously 0·1 Gm., increased to 0·7 to 1·0 Gm.

The Gold is concentrated in the liver instead of in the kidneys.

laid to be 10 times less toxic than Krysolgan. Indications as for Sanocrysin. fresh or extensive disease smaller doses must be employed.—Per Pres., y, '29,250.

The Gold compounds have not yet proved themselves of value in practice.— Malcolm Dyson, Pres., April, '29,124—128.

Distribution of Gold after intravenous injection. Tests made on rabbits w that about two-thirds of the metal is eliminated in the urine and the ainder in the fæces. After a week, the intestines, especially the large estine, show considerable though variable amounts.—Analyst, '26,97.

Gold exerts a selective action on tuberculous lesions and is therefore of ue in tuberculosis and lupus erythematosus. Discussion on the various nplex Organic Gold compounds.—L. i./30,691; B.M.J.E. ii./30,80.

Medicinal Gold compounds.—Solganal, etc.—P.J. ii./29,266.

BARIUM.

Ba=137·36.

All Salts of Barium except the Sulphate.

℗ **Barii Sulphidum**.—BaS=169·42.

Dose.—½ to 1 grain in pills coated so as to be more likely to dissolve the intestines than in the stomach.

A greyish yellow powder, soluble in water, given as an alterative syphilitic affections.

Barium Sulphide Depilatory. *Syn.* (Causticum Barii).

Barium Sulphide, in fine powder from 1 to 3, Wheat Starch 3.

When required for use, make into a cream with water, spread on part and let it remain five or ten minutes, then remove with a nt knife.—N.B.—It temporarily reddens the skin.

℗ *Another formula* is Barium Sulphide 5, Powdered Soap 1, French alk 7, Starch 7. One part of this mixed with 3 of water, is applied d to avoid possible dermatitis, is washed off after 5 minutes. May used from time to time.

Strontium Sulphide.—SrS=119·69, is also used. A patented German paration contains Strontium Sulphide 12, Corn Starch 40, Talc 35, Dextrin Nerolin 1, and Essential Oil 5 parts. It is claimed that the Dextrin protects skin and hair papilli and prevents the bad odour during use.—P.J. i./25,13.

Barii Sulphas. P.G. VI., U.S. X., F.E. VIII., P. Ital. V. P. Belg. IV. $BaSO_4$=233·42.

Dose.—For X-ray work only, 2 to 5 ounces (**60 to 150 Gm.** approx. in a cornflour or other 'meal' of about 6 to 15 ounces.

A heavy white powder insoluble in water and acids.

For outlining portions of the alimentary tract, instead of Bismuth Carbonate and Subnitrate (*q.v.*).

Poisoning has resulted from Bismuth Salts. The latter, however, have the advantage of higher molecular weight, and hence form darker shadows.

Barium Sulphate Suspensions in Olive Oil 10, 20%, etc., have been used for bladder examination.

Atropine is a valuable adjuvant in visualisation of the appendix. 1 mg. Atropine in an enema an hour before the Barium increased visualisation.—Jl. A.M.A. ii./25,1762.

Enema Barii Sulphatis C.X. *For X-ray Examinations.*

Barium Sulphate 192, Methylated Spirit 45, Mucilage of Gum Acacia 20, Distilled Water to 900 (6 ounces, $1\frac{1}{2}$ ounces, $\frac{3}{4}$ ounce to 30 ounces respectively).

U.C.H. directs Barium Sulphate 40 ounces, Tragacanth Powder 60 grains, Water to 80 ounces. Dilute with equal amount of water at time of use. This is a satisfactory formula for **Emulsio Barii** with addition of flavourings *e.g.*, Lemon Oil if required.

Emulsio Barii et Bismuthi C.X. *For X-ray Examinations.*

Barium Sulphate 16, Bismuth Carbonate 16, Water 45.

($\frac{1}{2}$ ounce, $\frac{1}{2}$ ounce and $1\frac{1}{2}$ ounces respectively.)

I–X Barium Meal.

Barium Sulphate 85, Aluminium Silicate 10, Malted Milk 5, Saccharin a trace. Mix 3 to 4 ounces with 8 ounces of Water.—N.N.R., Jl. A.M.A. ii./29,769.

✱**Barolac** (T.M. 515146) **Brand Barium Sulphate Suspension.**

Contains 30%. White, tasteless, odourless and neutral. Contains no suspending agent, hence yields a clear-cut shadow. Used as an opaque meal for X-Ray examinations.

Bulky Barium Sulphate, 33% in water, according to our experiments, is best prepared by dissolving Barium Chloride 244 in water 700, and Sodium Sulphate 322 in water 700, mixing, washing by decantation until Chlorine-free and finally making the volume 700.

The investigation included the use of five times and ten times the quantities stated of water, in each case decanting, washing, and diluting to the required final volume, and finally measuring the size of the particles under the microscope. *There was no material difference in size,* namely, between 1/500 and 1/250 millimetre. It was expected that the degree of dilution would affect the magnitude of the particles.—W.H.M., Nov., 1931.

Sulfate de Barium Gelatineux Fr. Cx. Nouv. Supp. '26, is in paste form, containing 55 to 58% of water.

Bariumised Wool for X-ray work in œsophagoscopy.—W. Frank Wilson, B.M.J. i./25,656.

Ⓟ**Barium Thiosulphate** inadvertently administered in place of Barium Sulphate caused death.—P.J. ii./21,315; C. and D., Oct., 1921, p. 47.

Caution.—*Barium Carbonate* is also soluble and hence poisonous. Confusion with Bismuth Carbonate occurred.—P.J. ii./21,344.

Ⓟ**Barium Chloride** and other Salts are in the Supplementary List of Drugs.—*q.v.*

BELLADONNA.

Deadly Nightshade.

[P1] "*Belladonna and all preparations or admixtures (except Bella-ına Plasters—which are* (P)*) containing* 0·1 *or more per cent. of lladonna Alkaloids.*"

All parts of the plant *Atropa Belladonna* (*Solanaceæ*) yield the alka-ds Hyoscyamine and Atropine. The root contains from 0·3 to % (Maben states rarely as much as 0·5%) of total alkaloids—efly Hyoscyamine. Old roots may contain a little Atropine.—nry. The leaves contain 0·2 to 0·7%, principally Hyoscyamine.

The **total alkaloids** of Belladonna are twice as active as Atropine, without ng more toxic. Recommended in treatment, especially in spasm and gotomy.—L. ii./25,241.

For details as to cultivation of Belladonna, varying Alkaloidal content he Drug, and Assay Methods see Vol. II.

NTERNATIONAL PREPARATIONS of Belladonna compared, with special erences to their standardisation.—A. J. Jones, P.J. ii./23,106.

Stabilised Belladonna Leaves (Fresh) by vapour of 96% ohol heated in an electric oven. ¼ to ½ atmospheric pressure needed to enzymes. Stabilisation, however, thought of no great advantage. Appear-e inferior. Modified Assay method needed.—J. P. Todd, P.J. i./30,94.

Antidotes.—See Atropine. Poisoning by Belladonna is well ated by Pilocarpine.

Belladonna berries caused poisoning. Pilocarpine 1/10 grain hypodermically, water bottles, subsequently more pilocarpine (1/6 grain) and again repeated h soap enema. Recovery.—Mary E. Joll, L. ii./16,647.

Eating rabbit which had fed on the plant caused poisoning. Pupils became ted, mouth dry; giddiness and rapid pulse.—D. Firth and J. R. Bentley, ii./21,901.

Poisoning by topical application of a liniment containing Belladonna.—ed, per Clin. Jl., May 30/23,264.

A fatal case of (most probably) chronic Belladonna poisoning, in which 1 2 drachms of the Tincture had been taken every day for 6 years.—J. Spears. M.J. i./27,1105.

[] **Belladonnæ Folia** (*B.P.* '14), U.S., F.E. VIII., P. Belg. IV. nen as Belladonnæ Pulvis), and P. Helv. contain not less than % total or mydriatic alkaloids. *Dose.*—1 grain.

Those of Fr. Cx. have no standard. Maximum single dose 2 grains, ximum during 24 hours 7½ grains approximately. P. Ital. V., not ndardised, 0·1 and 0·4 Gm. respectively.

[] **Belladonnæ Radix** (*B.P.* '14) without standard. U.S. requires 5% total alkaloids of Belladonna.

Dose.—¾ grain (**0·05 Gm.**).

Uses.—Externally relieves the pain of rheumatism, neuralgia, ordee, and local inflammations, as of the breast. In leucorrhœa, ginal injection of Tincture 3, Sodium Bicarbonate 1, and Water 0 is useful.—R.

Internally relieves spasm, palpitation, menstrual pain, headache, ooping-cough, petit mal, checks profuse perspiration, and in-ntinence of urine. In acute sore throat. Acts on the eye as mydriatic. Relieves the dyspnœa of asthma. A rash on the n, said to be like that of scarlet fever, may be produced by in-nal and local use of Belladonna.

May produce congestion of the throat.—B.M.J. ii./09,542.

HEART FAILURE in diphtheria treated with.—L. i./06,282.

OBESITY associated with voracious appetite well treated. By its inhibitor action on the secretion of the gastric glands Belladonna reduces hyperacidit of the gastric juice and thus takes the edge off the appetite. Especiall indicated where there is cardiac weakness which prohibits physical exercises.- B.M.J.E. ii./13,39, *cf.* also Atropine.

URINARY INCONTINENCE.—Belladonna should only be used to 'break th habit' and never pushed for more than two months at a time. It is useles and even harmful when there is definite lack of tone in the sphincters; her Nux Vomica is indicated. Thyroid (advocated by Leonard Williams) is usefu in some cases, especially when there are adenoids. Alkalis may be useful wher the urine can be shown to be hyperacid.—F. Hernaman-Johnson, L. i./21,129

ASTHMA is due to over-excitability of the pneumogastric system; Belladonn is the best remedy.—Per Pres., Jan., '23,10.

Though used 'to allay the sense of griping' in the intestines, when give with purgatives, there is no evidence that it does so.

℗ **Collodium Belladonnæ.**—*Martindale.*

Shake liquid Extract of Belladonna (*B.P.* '14) 50, Magnesium Oxide Light 1 with Canada Turpentine 4, Castor Oil 2 and Ether 40, allow to stand 12 hours Decant, filter, dissolve Camphor 1½, and Proxylin 2½ in the mixture and ad Ether *q.s.* to 100.

Ⓟ **Emplastrum Belladonnæ.** (*B.P.* '14). (Ⓟ *cf.* Emp. Plumbi)

The *B.P.* '98 plaster produced toxic symptoms (skin irritation) It was only half the strength of that of the *B.P.* 1885, but it wa still too strong to be used with safety. The *B.P.* '14 plaster wa again reduced to ½ strength, viz., it contains 0·25% alkaloids.

An explanation of its supposed effect in stopping milk secretion is tha after the plaster is applied no milk is removed, and so less and less is secreted— the action is merely mechanical.—D. Grieve, C. & D., Dec., 1921, p. 856.

See also K. Mackenzie under Pituitary Extract.

Must not be applied by the midwife to mothers too ill to feed their babies where there is heart disease, on account of paralysing effect of Atropine on the vagus, with consequent quickening of heart's action.—W. H. F. Oxley B.M.J. i./31,7.

Bee and wasp stings are well treated by belladonna plaster—if slight, lef on short time; if severe (? entered vein), several days may be necessary— gives considerable relief. Probably good for mosquito stings also.

Ⓟ **Emplastrum Belladonnæ Extensum.**

Belladonna plaster in rubber combination spread on calico in porous sheets 7 in. by 5 in. and in yard rolls 7 in. wide, porous and non-porous also prepared with Belladonna and Aconite combined.—(*American*)

Ⓟ **Emplastrum Belladonnæ, U.S. X.** An adhesive plaster containing Extract of Belladonna leaves corresponding to not less than 0·25% or more than 0·3% of the alkaloids of the leaves.

ⓅFR. CX. has Belladonna Extract (FR. CX. *q.v.*) 1, Elemi 1, Diachylon Plaster (FR. CX.) 2.

℗ **Extractum Belladonnæ Liquidum** (*B.P.* '14).

Dose.—⅓ to 1 minim (**0·02 to 0·06 Cc.**).

Prepared from Belladonna root in fine powder, by repercolation process, adjusting so that the extract contains 0·75% alkaloids.

P. Ital. V. contains 0·25% (*w/w*).

℗ **Extractum Belladonnæ Siccum** (*Syn.* **Alcoholicum**) (*B.P.* '14).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

This is prepared *from the leaf*—it is a mixture of alcoholic extract and powdered leaf, containing 1% of alkaloids. F.I. (Second) recommended 1·3% alkaloids. P. Ital. V. is 1% total alkaloids made by means of 95% alcohol.

'he 1·3% alkaloids is roughly a mean figure of the standards in the chief rmacopœias.—P.J. i./26,294.

nuresis in children is best treated by increasing doses of Belladonna extract bed time, tonic measures, such as Cod Liver Oil, Iron and Nux Vomica uld be employed during the day time.—Tirard, Med. Treatment.

Extractum Belladonnæ F.I. to be a "solid" extract (containing about % of water) prepared by means of alcohol 70% from the leaf.—FR. CX., P. DAN. agree with F.I. The FR. CX. follows the F.I. method of making gives a method of estimating, but does not set up a standard. It states x. single *dose* ½ grain. Max. in 24 hours 1½ grains approx. P. Ital. V. is ilar, containing 1·25% alkaloids.

Extractum Belladonnæ (Foliorum) U.S. X., made with 3 parts alcohol 1 water as solvent and contains added glucose for pilular consistence. wdered Extract is made differently. Both contain a mean of 1·25% ladonna alkaloids.

Extractum Belladonnæ, P. Austr., is alcoholic from the leaves and tains 2% alkaloids; P1 **Ph. Ned. V.** is the same but contains not less n 1·15 to 1·3% alkaloids. P1 **P. Belg.** contains 1·5% alkaloids. r average yield of alkaloid, see Vol. II.

Extractum Belladonnæ Viride (*B.P.* '98).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**), increased to 2 grains more.

A green extract prepared from the expressed juice of leaves and ung branches (3 to 3½ ounces are procurable from a pound of leaves); contains from 0·5 to 2·0% (average 1) of alkaloids, and standardd to contain 1%.

Fluidextractum Belladonnæ Radicis, U.S. X.

Average dose.—¾ minim (**0·05 Cc.**). Hydroalcoholic percolate; cons 0·45 Gm. Belladonna alkaloids in 100 Cc. *For assay vide Vol. II.*

Glycerinum Belladonnæ, B.P.C., R.O.H.

Green Extract of Belladonna, 1 ounce; Boiling Distilled Water, 1 achm. Rub in a warm mortar to a smooth paste, and add Glycerin, ., to 2 ounces (fluid).

To check pain and inflammation, is often painted on boils, abscesses d carbuncles, and covered with a poultice, also applied on lint to e breasts to disperse milk.

Tragacanth added in proportion of 6 grains to the ounce would thicken the paration.

Linimentum Belladonnæ (*B.P.* '14).

Camphor 1, Alcohol (90%) 6. Dissolve and add Liquid Extract of lladonna 10, Distilled Water 2, Alcohol (90%) *q.s.* to 20. A useful lative for neuralgia and rheumatism. Contains 0·375% alkaloids. Sprinkled on impermeable piline relieves lumbago.

Poisoning by the Liniment. Strychnine hypodermically, strong , and making the patient vomit, brought a patient round.

Linimentum Belladonnæ cum Chloroformo. Chloroform Liniment 1, Soap Liniment 1, Belladonna Liniment 2.

P1 B.P.C. Chloroform 1, Belladonna Liniment 7. (The previous rm may be better for sensitive skins.)

Pilula Quininæ cum Belladonna, R.O.H.

Green Extract of Belladonna ⅛ grain, Quinine Sulphate 1 grain, nfection of Roses *q.s.*

℞ **Pilula Belladonnæ, Nucis Vomicæ et Cannabis.**

Extract of Belladonna, Nux Vomica Extract and Cannabis Extract, of each ½ grain. For the constipation in gastric ulcer. The cannabis has a good effect on the mental side, belladonna regulates peristalsis and the Nux Vomica has a good effect as an aperient and for improving tone of the gut.

℞ **Suppositoria Belladonnæ** (*B.P.* '14).

Each contains 0·14 Cc. of freshly evaporated Liquid Extract of Belladonna in 1 Gm. of Theobroma Oil, *i.e.*, 0·001 Gm. of root alkaloids.

Ⓟ **Pessaries** (60 grains weight) may also be made containing the same or double the quantity of extract. *Vide also* **Ovules.**

Unilateral convulsions have been produced by their use, together with dryness of throat, dilated pupils (special idiosyncrasy).

♀ ℞ **Suppositoria Belladonnæ** ½ grain, **et Morphinæ Hydrochloridi** ¼ grain.

These possess a useful sedative effect, and are valuable in irritated and painful conditions of the rectum and prostate and for chordee.

Ⓟ **Tinctura Belladonnæ** (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc**).

This is prepared 10% *with dried leaf* and standardised to 0·035% alkaloids=F.I. approx., Fr. Cx., Ph. Ned. V. and U.S. are similar. P. Ital. V. 0·03%, *B.P.* '98 was Liquid Extract of Belladonna (root) 1, Alcohol (60 per cent.) *q.s.* to 15. Hence the *B.P.* '14 tincture differs in colour. *It is* $\frac{7}{10}$ *strength of B.P.* '98.

Uses.—Relieves the spasm of asthma and bronchitic cough; also bladder spasm set up by calculi and prostatic irritation. Full doses are useful for incontinence of urine. Of value in dyspepsia (*vide* ref. *post.*).

Flavoring.—Syl Myristicæ, Syl Rosæ; Syrupus Aurantii.

Ⓟ **Tablets** are prepared, equivalent to 2 and 5 minims, weighing 1 and 2 grains respectively.

BRONCHO-PNEUMONIA is sometimes well treated in early stages with 4 to 5 minim doses or ¼ grain of extract every 3 or 4 hours according to age of child and severity of case—combine with diuretics and diaphoretics.

In DYSPEPSIA 5 minim doses of Tincture before food results in reduction of acid values, both absolute and relative, of the stomach contents. Thought to inhibit and relieve spasmodic contractions.

For PTYALISM 10 drops of Tincture thrice daily or Pilocarpine Nitrate $\frac{1}{30}$ grain of benefit.

EXOPHTHALMIC GOITRE has been treated with Belladonna, and with Arsenic Bromide, and Digitalis added.

In ENURESIS valuable, give potassium citrate first, when the urine is hyper-acid, or Sodium Acid Phosphate if markedly alkaline.

POST-ENCEPHALITIC PARKINSONISM well treated with Tincture of Belladonna, 45 minims daily.—A. J. Hall, B.M.J. i./26,129.

Ⓟ **Mistura Belladonnæ Xanthoxyli et Hyoscyami.** *Syn.* TOWNS' SPECIFIC. *Dose.*—6 to 8 minims (**0·4 to 0·5 Cc.**).

Belladonna Leaf Tincture (U.S. 1890) 2, Fluidextract of Xanthoxylum 1, Fluidextract of Hyoscyamus 1.

The above dose is equivalent to a little less than 3 to 4 minims *B.P.* '98 Tincture. Said to be specific in morphinism, cocainism, and alcoholism.

Increase from 6 drops, by 2 drops every 6 hours, until 16 drops have been reached. Discontinue for a few doses if symptoms of Belladonna poisoning are observed.—E. Huntington Williams, "Opiate Addiction."

Linimentum Belladonnæ Æthereum.
Prepared with Ether, 1 in $1\frac{1}{2}$, with Camphor $\frac{1}{20}$. Recommended in ace of Alcoholic Liniments for quicker absorption.

Unguentum Belladonnæ (*B.P.* '14).
Contains a basis of Benzoated Lard and Wool Fat. Made by vaporating Liquid Extract of Belladonna *q.s.* to provide 0·6% kaloids.
Said to be too strong for general use and may cause unpleasant symptoms. To lessen excessive secretion in nasal catarrh, this ointment has been em-oyed diluted 5 to 10 times with Soft Petroleum and a small proportion of annin or Gallic Acid added.

Ⓟ **Unguentum Populi,** P. Belg. IV. Macerate Dry Belladonna eaves 125, Dry Henbane Leaves 125 and Dry Poplar Buds 200 (all ruised) in Alcohol 90% 150 for 2 hours; warm on a water-bath with ard 1000 for 3 hours with stirring until the Alcohol has evaporated. train, press and stir until the ointment sets.
The formula in Fr. Cx. differs from this.

BISMUTHUM.

Bi=209·0.

METALLIC BISMUTH PREPARATIONS FOR INJECTION.

Bismuth Metal has been largely used in conjunction with, and in me quarters instead of, Mercury in treatment of syphilis and yaws. he preparations used are summarised.

reparation of Metallic Bismuth in fine powder.
The Pharmacopœia Com. Rept. (Second Report of Pharmacy Sub-Committee, ay, 1931) states this may be obtained by reducing a solution of Bismuth richloride in Hydrochloric Acid with Hypophosphorus Acid. It is in the rm of a dull grey powder, and none of the particles when examined under ie microscope should exceed 15 microns (15/1,000 millimetre=1/66 milli-etre approx.) in diameter.
The use of Bismuth Trichloride we found in an investigation to be unneces-ry. It is best to start with Bismuth Oxychloride, *e.g.* Bismuth Oxychloride kilo is dissolved in Water 10 litres by means of Hydrochloric Acid, and armed on the water-bath with the reducing agent, adding it in small quanti-es at a time. Wash and collect *secundum artem.* Hypophosphorus Acid in xcess of theory (4 times theory):

$$2BiCl_3 + 3H_3PO_2 + 3H_2O = 2Bi + 3H_3PO_3 + 6HCl$$

needed.
We also included in our experiments numerous trials using a dilute Gum cacia solution as protective, hence tending to reduce the size of the particles *f.* Gutbier and Hofmeyer, Zeit Anorg. Chem. 44,225), but no great advantage ould be seen by its use.
The agglomeration of the particles of the metal may be overcome by atten-on to details of temperature and technique in general.
The particles in the preparation made as above, were, on an average 1/60 m. in diameter. Those in preparations of commerce were larger.—W.H.M., ov., 1931.
The absorption rate of Metallic Bismuth is uniform, and action eady. In syphilitic affections of the heart and respiratory system ismuth is the only drug to fall back on. Only danger to avoid is ot to inject into the blood stream, as it causes paralysis and death ithin two hours.—C. F. Chenoy, I.M.G., Nov. '26,536.
Soluble compounds are more toxic and painful than insoluble Bismuth eparations. ***Metallic Bismuth is the least toxic***—should given by deep subcutaneous route. Poisoning may occur in spite of absence

of blue line. Tertiary lesions of mouth and tongue and symptoms of tabes respond particularly well. Valuable in nephritis, jaundice and organic disease where Mercury and Arsenic are not suitable. Not an efficient substitute for Arsenobenzol. May have an inhibitory rather than a curative effect. It is not established that Bismuth is more effective than Mercury in the permanent cure of syphilis.—T. Anwyl-Davies, L. i./27,200; *ibid.* 148—152.

E. T. Burke obtained best results with metallic Bismuth.—Brit. Jl. Vener. Dis., per L. i./25,497.

Bismuth is more rapid in action on *S. pallidum in vivo* than Mercury but not so rapid as Salvarsan. It influences lesions as rapidly as Salvarsan and more rapidly than Mercury. It is free from danger in therapeutic doses—best given as metallic Bismuth in Isotonic Glucose.—David Lees, B.M.J. ii./27,298.

The tartrates and oleate are toxic to rabbits, causing necrosis of the tubules of the kidney. The maximum tolerated dose is about 0·2 Gm. per kilo intravenously. Precipitated Bismuth Metal has a tolerated dose of 0·4 to 0·5 Gm. per kilo.—B.C.A. '26,A975.

Superior to Mercury in syphilis. Intramuscular the best route, preferably of compounds not quite insoluble in water—Bismuth Salicylate one of the best. Oxychloride specially good. *Daily dose of Bismuth Metal fixed at 0·5 mgr. per kilo weight.* Routine treatment a series of 5 or 6 intravenous injections of Neosalvarsan, in doses of 0·6 to 0·7 Gm. and a series of 8 to 10 intramuscular injections of Bismuth Oxychloride in watery suspension in dose of 0·15 to 0·2 Gm., with a total of 18 Neosalvarsan and 60 Bismuth injections in 2 years. Definitely effective.—Svend Lomholt, B.M.J. ii./29,890.

Yaws.

Cannot be cured by Potassium Iodide and Mercury, but Bismuth Metal is effective. Three or more injections are needed and the treatment is used in Kenya and Tanganyika Territory on the lines of syphilitic treatment.—P. H. Manson-Bahr, Brit. Jl. V.D., Jan., '28, and others.

Metallic Bismuth caused necrosis; suspended in oil is slowly absorbed.—Svend Lomholt, L. ii./29,983.

Local nickel poisoning (2 cases) due to use of nickel-plated piston for Bismuth injections. An all-glass syringe should be used.—F. C. Eve, B.M.J. ii./29,1030.

Metallic Bismuth Sterules contain 0·2 Gm. in 1 Cc. of 5% Glucose solution. *Dose.*—0·5 to 1 Cc. intramuscularly into the buttocks.

✱**Bicreol** (T.M. 439276). *Syn.* Bismuth Cream.

Dose.—1 to 5 Cc. intramuscularly, alternating with organic Arsenic injections. Contains Bismuth Metal 0·15 Gm. per Cc. in a Creo-Camph base.

✱**Bismostab** (T.M. 447724). *Dose.*—0·5 to 1 Cc. intramuscularly using right and left buttocks alternately.

A preparation of 20% Bismuth in 5% Glucose solution. Painless and non-irritant.

Neo-trépol is a 10% suspension in isotonic solution. Given intramuscularly in doses of 1·5 to 2 Cc. every 3 or 4 days.—C. Levaditi, L. i./23,639.

Late syphilitic treatment. During 3 months a number of patients received 2·08 Gm. of Bismuth with 1,260 grains Potassium Iodide and 210 grains of Grey Powder. Three courses a year, or five in two years. 46 cases treated. Wassermann reaction negative in 65%.—T. Ferguson, B.M.J. ii./30,513.

Bismuthyl is a similar preparation in 10% suspension in a glucose medium. *Dose.*—2 Cc. intramuscularly every 5 days until 12 to 15 doses have been given.

✱**Bisglucol.** (T.M. 460418).—Bismuth in Glucose Solution.

Lupus erythematosus treated.—R. Hallam, L. i./31,216.

Syphilitic ocular conditions. Routine treatment 12 weekly intramuscular injections of Metallic Bismuth and Sulfarsenol followed by a course of Potassium Iodide.—E. O. Kirwan, B.M.J. ii./31,534.

A new Bismuth mineral, not previously described, containing 50% Bismuth Trioxide, 40% Tantalum Pentoxide, and 6·5% Niobium Pentoxide, from Uganda.—Imp. Inst. Rept., 1929.

Bismuth Salts and Compounds.

The absorbent action of the preparations of bismuth taken internally is increased by combination with antiseptic compounds,

These combinations have been much recommended in those disorders of the digestive tract in which several infectious diseases make their early manifestation. Thus the Salicylate, and Naphthol, Phenol, Pyrogallol and Bromophenol compounds have been brought into use. These check the fermentative processes forming ptomaines, yet, it is said do not interfere with intestinal digestion.

Bismuth compounds are in general ***incompatible*** with Potassium Iodide, the insoluble brown Bismuth Tri-iodide being formed.

Bismuth Poisoning.—The most striking features are stomatitis, black line and white diphtheritic membrane on the gums and Bismuth in the urine. Beck's Paste has caused poisonous symptoms.—L. i./13,1039.

See also *Sodium Potassium Bismuthyl Tartrate.*

Bismuthi Benzoas, Bismuth Oxybenzoate.

C_6H_5—CO.O (BiO) (?)=346·039.

Dose.—5 to 20 grains (**0.3 to 1.2 Gm.**) thrice daily.

A white powder insoluble in water, containing about 65% Bismuth Oxide. Antiseptic, internally in gastro-intestinal diseases, externally to chancroid, indolent and sloughing ulcers.

Bismuthi Carbonas. *Syn.* **Bismuth Oxycarbonate or Subcarbonate.** $(Bi_2O_2CO_3)_2.H_2O$ = 1038·1056. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**). Slipule No. 00 holds 10 grains.

May be suspended in an ounce of water by means of a drachm of mucilage of tragacanth or about 6 grains of compound powder of tragacanth. Prescribers should indicate if a suspending agent is required. A light variety of the substance needs no suspending agent.

The following forms an agreeable dose :—

Mistura Bismuthi. *Dose.*—1 ounce.

Bismuth Oxycarbonate 10 grains, Sodium Bicarbonate 10 grains, Mucilage of Tragacanth 1 drachm, Compound Tincture of Cardamoms 30 minims, Spirit of Chloroform 10 minims, Cinnamon Water to 1 ounce. **Tablets of Bismuth Carbonate** contain 5 grains, to be crushed and swallowed with a little water.

Mistura Bismuthi Astringens N. E. H.

Bismuth Carbonate 2 grains, Tannin 1½ grains, Aromatic Powder of Chalk with Opium 2 grains, Water 1 drachm. Dose for a child.

For X-ray Diagnosis of conditions of the œsophagus and stomach large doses are frequently ordered.

'Standard' Opaque Meal.

Bismuth Carbonate 4 ounces, Lactose 1½ ounces, Water, *q.s.*, to make a thin emulsion—less than a tumblerful.—A. C. Jordan, B.M.J. ii./13,1348.

'Homogeneous Bismuth Mixture.'—For use in radiography. 3⅓ ounces (100 Cc.) contain ⅔ ounce (20 Gm.) approximately.

Bismuth Carbonate 120, Gum Arabic 20, Tragacanth 5, Syrup 150, Water 150. Does not separate into two layers and hence give deceptive effect in radiography.—B.M.J.E. i./13,42.

Bismuth Meal.—Vic. Park.

Bismuth Carbonate 3 ounces, Bread, pounded up, 3—4 ounces, Milk 15 ounces.

Bismuth Oxychloride is preferable. **Barium Sulphate** *q.v.* has displaced the use of Bismuth Compounds.

Bronchoscopic Insufflation with Bismuth Carbonate of value in radiography of the lungs. One ounce can be safely used in adults.—B.M.J.E., 26,35.

GASTRITIS is usually well treated by a dose of Bismuth Carbonate with a small dose of Morphine and 2 or 3 minims of Dilute Hydrocyanic Acid.—Whitla, Pract. Med.

In ULCERATIVE COLITIS, Bismuth Carbonate 15 grains to the pint, als Potassium Permanganate 1 in 30,000, useful and soothing. In the late stages irrigation with Perchloride 1 in 20,000, Zinc Sulphate 4 drachms i 3 pints, and Silver Nitrate 5 to 10 grains to the pint, effectual when use alternately. Chlorodyne was beneficial as anodyne.—B.M.J. i./11,864.

Intimately mixed with Liquid Paraffin it is stated to be better tolerated In this way it is not attacked by the hydrochloric acid of the stomach.—A Vicario, Jour. Pharm. Chim., 1914, 9, p. 458.

HYPERACIDITY is well treated by powders containing Bismuth Carbonat 30 grains, Magnesium Carbonate 20 grains, and Sodium Bicarbonate 30 grains —G. Rankin, B.M.J. i./15,1036.

RENAL INSUFFICIENCY well treated with Bismuth Carbonate 50 Gm. daily.— per Pr., May, '26,385.

ASCARIS and STRONGYLIS. Large doses, *e.g.*, 30 Gm. in 24 hours, effective —Y.B.P., '26,193.

Pulvis Bismuthi Compositus. *Syn.* PULVIS ALKALINUS COMPOSITUS.—*Hugh MacLean.*

Dose.—First Week. A teaspoonful in a little water or milk 6 or 7 times daily (preceded by a glass of milk with 10 grains Sodium Citrate added to prevent coagulation), with double dose last thing at night and extra powder during night if patient wakes. If bowels disturbed excessively, adjust powder or add Magnesia Cream. *Second Week.* If discomfort and symptoms still persist continue as first week for a few days, otherwise reduce powder to 4 or 5 doses daily and reduce milk, adding beaten up eggs and gradually increasing diet so that by end of week patient is receiving toast, butter, eggs, custard and cream. Dose immediately before retiring and during night as before. *Third Week.* Reduce to 3 or 4 doses daily and one at bedtime and increase food to include fish and potatoes and cereal puddings. *4th to 6th Weeks.* Powder 3 times daily with dose at bedtime and reduce or give up milk. A small amount of meat may be taken the 5th week. *After-treatment.* Continue powder two or three times daily for further 6 weeks, with a dose at bedtime for a long time afterwards, and return to milk or light diet with powder 4 or 5 times daily if symptoms return at any time.

Form I.—Bismuth Carbonate 2, Sodium Bicarbonate 1, Magnesium Carbonate (Heavy) 2.

Form II.—(Hospital Formula). Bismuth Carbonate 1, Sodium Bicarbonate 3, Magnesium Carbonate (Heavy) 3, and Creta Preparata 3.

For the intensive alkaline treatment of gastric and duodenal ulcers. Smoking and Alcohol should be avoided. Practically all uncomplicated ulcers can be cured in a comparatively short time by this treatment.—Hugh MacLean and Co-workers, L. i./28,14–19; B.M.J. i./28,619.

Criticism of the word 'cure' and of omission of any reference to the '**Sippy**' **Treatment** (see p. 536), which is on similar lines. Renal disease and pyloric stenosis contraindications.—J. A. Ryle, *ibid.* 104; also T. Izod Bennett and A. Moncrieff, *ibid.* 104. Reply to criticisms—no claim to originality; pyloric stenosis not found a contraindication. Main purpose to help the general practitioner.—Hugh MacLean and Co-workers, *ibid.* 157.

Creta præparata used in preference.—J. Rutherford Hill, P.J. i./30,99; see also H. P. Arthur, *ibid.*, 157; also ii./29,463.

ulvis Bismuthi Compositus N. H. I.
Dose (average).—½ teaspoonful in a little water.
Bismuth Carbonate 1, Sodium Bicarbonate 1, Heavy Magnesium Carbonate 3, Prepared Chalk 3.

ulvis Bismuthi Compositus, L.H.
Dose.—1 drachm.
Bismuth Carbonate 1, Heavy Magnesium Carbonate 2½, Sodium icarbonate 2½. An antidyspeptic powder.
Caution: **Ferrier's Snuff** was previously called Pulvis Bismuthi Co., but his name is now dropped for the Snuff.
For Alkaline Treatment with Tribasic Calcium or Magnesium Phosphate (Hurst), see pp. 256, 538.

astralka.
Dose.—One teaspoonful in half a glass of milk or water before meals and at edtime.
A Canadian preparation used as an antacid and anti-fermentative, containing Bismuth Carbonate, Bismuth Subgallate, Calcium Carbonate, Magesium Carbonate, Sodium Bicarbonate, Sodium Bromide, Papain, and Oil Peppermint. In gastritis, hyperacidity, flatulence, etc.

℗ ✱ **Sedeff.** (T.M. No. 204175). *Dose.*—1 to 2 drachms in water.
Contains Morphine (1/30 grain in 1 drachm), Bismuth and digestive rments. A palatable granular effervescent preparation, for use in ckness and derangement of digestive functions.

℗ **Pastillus Bismuthi Carbonatis** (3 grains) **cum Morphinæ Acetate** (1/40 grain), *v.* Glyco-gelatin.

℞ [P] **Collapsubes** (with rectal tube attachment) of Bismuth 20%, orphine ½%, and Cocaine 3% Ointment,—**Unguentum Bismuthi orphinæ et Cocainæ,** *Allingham* (Bismuth Carbonate 20, Morphine ydrochloride ½, Cocaine Hydrochloride 3, Soft Paraffin to 100) are eful as astringents in hæmorrhoids and for allaying irritation.

quor Bismuthi et Ammonii Citratis. *Syn.* **Liquor Bismuthi,** (*B.P.* '14.) *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).
Prepared by interaction of Bismuth Subnitrate with Citric Acid id Water until the product is soluble in Ammonia and then after ashing dissolving in Ammonia. Contains 5 grains of citrate=3 ains of Oxide of Bismuth in 1 drachm. For some data as to manucture, *see Vol. II.*
Flavoring.—Syl Lavandulæ; Syrupus Aromaticus.
In following the *B.P.*'14 directions the mixture of Bismuth Subnitrate, tric Acid and water sets hard and is not completely soluble in Ammonia.—F. nfold suggests alteration of directions.—P.J. ii./16,567. The amount of ter should be 60 instead of 20. Place the Bismuth Oxynitrate, Citric id and water in a vessel and allow the reaction to proceed.—J. H. Franklin, J. i./27,53.
Bismuth and Ammonium Citrate (when strongly alkaline) is incompatible th Sodium Bicarbonate. Besides Ammonium Hydroxide, the alkaline ydroxides yield precipitates of a basic Bismuth Carbonate.—A. E. Lum, J. i./29,597.
Evaporated to a syrup, spread on glass and dried, it produces :—

smuthi et Ammonii Citras, U.S. IX.
Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).
In soluble shining pearly or translucent scales. 1 Gm. yields not s than 0·46 or more than 0·52 Gm. Bi_2O_3.

Liquor Bismuthi Concentratus, B.P.C. (Double strength of Liquor *B.P.* '14).

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Dissolve Bismuth Subnitrate 14, with gentle heat in Nitric Acid (*B.P.*'14) 10 previously diluted with an equal volume of water and add Citric Acid 10 dissolved in distilled water 14. Add gradually with stirring Sodium Bicarbonate 17·5 previously mixed with distilled water 14; wash the precipitate by decanting until free from nitrates and dissolve it by adding Solution of Ammonia 12 or *q.s.* Finally add Ammonium Citrate Solution 24 and make up to 100 with water.

Ⓟ **Liquor Bismuthi Sedativus.** *Syn.* ***Bisedia.** (T.M. 252630) *Schacht.*

Dose.—1 drachm (**4 Cc.**) containing Bismuth and Pepsin with $\frac{1}{24}$ grain Morphine Hydrochloride, 2 minims of Hydrocyanic Acid, and 5 minims of Tincture of Nux Vomica.

For acute dyspepsia, vomiting of pregnancy and gastric hyperasthenia.

***Bismosal** (T.M. 317911 and 433830). *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**). Children, 5 to 20 minims (**0·3 to 1·2 Cc.**). Contains Bismuth as hydroxide in suspension with Salol. In diarrhœa.

Bismuthi Citras, $BiC_6H_5O_7 = 398·039$. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white crystalline powder, yielding not less than 56 nor more than 58% pure Bismuth Oxide. Insoluble in Water and Alcohol 90% but soluble in Ammonia. It is astringent and stomachic.

Bismuth Citrate prepared by usual methods is not $BiC_6H_5O_7$, but impure Monobismuthylcitric Acid $H_2C_6H_5O(BiO)$. Alkalis, apparently, do not form salts of this acid but more complex substances.—E. W. Adams, P.J. ii./24,87.

Bismuth Citrate Gauze.—May replace Iodoform Gauze, being non-toxic and without odour. May be left in uterine cavity at least five days and still be free from offensiveness. For use after curettings, in nasal and aural surgery and for burns. Strips, 1, 2 and 3 inches wide, are made, also 36 inches.

Elixir Bismuthi.—*Dose.*—1 drachm (**4 Cc.**).

Bismuth Citrate 1, Distilled Water 6, Solution of Ammonia $\frac{3}{4}$ or *q.s.* Dissolve, filter and add Simple Elixir *q.s.* to 30.

Ⓟ **Mistura Bismuthi cum Pepsina.**—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted.

Contains Bismuth Citrate 2 ounces, Pepsin (soluble) 320 grains, Morphine 5 grains, Strychnine $1\frac{1}{2}$ grains, Dilute Hydrocyanic Acid 320 minims, Chloroform 30 minims, Saccharin Elixir 480 minims, Rosein Acetate *q.s.*, Water to one pint. This mixture will not deposit.

This preparation is retained as mixtures of the kind are ordered, but the action of the Pepsin is seriously interfered with by the other ingredients. (*Cf. our experiments with Pepsin, Vol. II., and Bismuth and Pancreatin, postea.*)

Tabellæ Bismuthi et Pepsinæ.

Bismuth Carbonate 3 grains, Pepsin 3 grains, in chocolate basis. Useful digestive. Compressed Tablets are also prepared.

ablets Bismuth, Pepsin and Cascara.—*Martindale.*

Dose.—One or two as required after meals.

Bismuth Carbonate 3 grains, Pepsin 3 grains, Cascara Extract grain. A useful digestive.

ismuth and Pancreatin.—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

An alkaline stimulant digestive combining the sedative properties f Bismuth with the pancreatic ferment in a compatible form, and eing an *alkaline* solution the mixture will promote gastric secretion. he peptonising power of the preparation is practically speaking ermanent. Our investigations show that Pepsin and Bismuth ixtures are mutually incompatible—the activity of the ferment n such mixtures is interfered with by the necessary alkalinity of ne Solution of Bismuth unless an acid Bismuth Salt is employed . Bismuth Tartrate Acid). Pepsin can only operate in a slightly cid solution (equivalent to the Hydrochloric Acid of the normal astric juice). The alkalinity of Bismuth and the Hydrochloric Acid equired with Pepsin are incompatible in a mixture, resulting in the recipitation of Bismuth Oxychloride, hence the more compatible ismuth and Pancreatin.

The preparation has been found of particular service as a digestive in the ritated condition of the stomach during convalescence from illness.

Mistura Bismuthi Phenolis et Morphinæ.

Dose.—1 ounce from 2 to 3 hours after every meal.

Bismuth Carbonate 40 grains, Phenol 2 grains, Solution of Morhine Hydrochloride 15 minims, Mucilage *q.s.*, Compound Gentian nfusian to 1 ounce.

Duodenal ulcer is relieved by this. For the constipation produced y large doses of Bismuth give **Pilulæ Hydrargyri Subchloridi, hei, Cascara et Capsicin.**—Guthrie Rankin.

ismuthi et Cinchonidinæ Iodidum (short name '**Bisciniod**'—*—Martindale*). $C_{19}H_{22}N_2O.HI+BiI_3=1011{\cdot}9234$.

Dose.—$\frac{1}{6}$ to 1 grain (**0·01 to 0·06 Gm.**).

Yellowish red powder, insoluble in ordinary solvents, containing bout 20% Bismuth, 40% each Iodine and Cinchonidine.

This substance, containing digestive, febrifuge and antiseptic conituents, should certainly find utility in therapeutics.

iscinlod Suppositories.

Contain $\frac{1}{2}$ grain (**0·03 Gm.**) in Cacao Butter basis.

ismuthi Nitras Crystallisatus, Fr. Cx., P.G. VI. *Syn.* Bismuthi Nitras 'Neutrus' F.E. VIII., P. Ital. V.

$Bi(NO_3)_3,5H_2O=485{\cdot}108$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

In colourless deliquescent crystals, which, if dissolved in a small uantity of water, give a solution with an acid reaction, this on furner dilution throws out Basic Bismuth Subnitrate. It is practically soluble in Alcohol 90%, but soluble in cold Glycerin. *cf.* Glycerinum ismuthi Nitratis *infra*. It is astringent and antiseptic, and useful or the diarrhœa of phthisis.

Glycerinum Bismuthi Nitratis.

Bismuth Nitrate in crystals 1, Glycerin to 4. Diluted 4 or 5 times with Glycerin is a stimulant application in eczema.

Bismuthum Hydroxydatum, Hydrated Bismuth Oxide.

$Bi(OH)_3$=260·0218, but the compound is not always uniform.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

An amorphous white insoluble powder, but soluble in Sulphuric Acid and Hydrochloric Acid in presence of water and in fixed alkalis in presence of Glycerin. Permanent in the air.

The following are FR. CX. directions. Shake Glycerin 150 Gm. with Bismuth Nitrate (cryst.) 100 Gm., add Water 100 Cc. in portions, shaking constantly to prevent formation of the Subnitrate. When dissolved filter if not clear, and pour the liquid, a little at a time, into a mixture of water 150 and 10% Potash Solution 850 Gm. When reaction complete add drop by drop Dilute Sulphuric Acid 100 Gm. (10% approx.—FR. CX.) mixed with its weight of water to neutralise, then render the mixture slightly alkaline. Wash the precipitate by decanting until a sample of the wash liquor leaves nothing on evaporation. Collect and dry at 100° C.

Employed in making Basic Bismuth Salicylate.

In an experimental quantity we obtained 45 Gm. of product from above quantities. The theoretical amount is 50% approximately.

Uses.—A substitute for bismuth carbonate : also injected.

LUPUS ERYTHEMATOSUS treated by 12 Bismuth Hydroxide injections of 3·75 grains, two injections a week : cured. Better than Arsenic.—B.M.J.E. ii./27,29.

SYPHILIS.—Suspended in Water and Glycerin stated to be preferable to the oily preparations.—Svend Lomholt.

Bismuthi Oxidum, Bi_2O_3=466.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Is prepared by boiling Bismuth Subnitrate in solution of Soda, washing and drying the deposited yellowish Bismuth Oxide. May be precipitated with acid from an alkaline solution containing glycerin.

Anderson's Ointment.

Bismuth Oxide 1, Oleic Acid 8, White Wax 3, White Soft Paraffin 9. In pruritus.

Bismuthi Oxychloridum, BiOCl=260·457.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A non-irritant cosmetic powder, pearl white or '*blanc de perle.*' Given internally it produces a coating on the irritated parts of the stomach or bowels. As insufflation to the larynx $\frac{1}{4}$ to $\frac{1}{2}$ gr.

✱**Bisoxyl** (T.M. 491273). A suspension of Bismuth Oxychloride in Chloretone solution. Initial dose 0·1 Gm., increased to 0·2 Gm., corresponding to 0·01 and 0·02 Gm. of the Bismuth salt for congenital syphilis.—T. M. Ling, L. ii./29,1034.

Bismuth Oxychloride preferred in syphilitic treatment. It is probably reduced to metal. Course of 4 Gm. in 10 injections. Give *concurrently* with Arsenobenzol, rather than Bismuth or Mercury *to follow*. Quinine Iodo-Bismuthate has disadvantage of low Bismuth content.—L. W. Harrison, L. i./30,764.

LUPUS ERYTHEMATOSUS treated with Bismuth metal, Bismuth Oxychloride, and Sodium Bismuth Thioglycollate injections, deep subcutaneous or intra-muscular, when possible once weekly or fortnightly, allowing 6 weeks, lapse after every 10 or 12 injections. Average dose, 0·3 to 0·4 Gm. per injection (latter considered max. dose). The Thioglycollate gave no better results. Acid Nitrate of Mercury used locally seems to improve treatment.—R. M. B. Mackenna, L. i./30,178.

***Bismurung** (T.M. 512988).—A Bismuth Oxychloride Ointment, 5 and 0%, for chronic lupus erythematosus, rubbed in for at least 2 minutes twice daily. Pustular folliculitis cleared up; tinea ungulum and chancroids also treated. May be of value in yaws.—R. M. B. Mackenna, L. i./31,126.

Nascent Bismuth Oxychloride.

Pain and vomiting due to catarrh or organic disease of the stomach treated by Bismuth Oxychloride in fine suspension made in nascent state by using Liquor Bismuthi and Dilute Nitro-Hydrochloric Acid *q.s.* The mixture suggested is: Liq. Bismuthi 6 drachms, Dilute Nitro-Hydrochloric Acid 1½ drachms or *q.s.*, Peppermint Water to 6 ounces. One half ounce in water *d.* shortly before or after meals. (In dispensing, the acid is to be diluted and added last so as to throw out the Bismuth as a dense white cloud.)—T. O. Nicholson, Pres., June, '20.

An **Oxybromide** is also made, with similar internal use.

Mucilago Bismuthi. For "X" Ray Diagnosis.

Bismuth Oxychloride 1½ to 2 or 3 ounces or more made into a thick paste with Acacia Mucilage for a dose, for determining condition of the œsophagus and for examining shape, position and motor function of the stomach. A special Bismuth Oxychloride *free from Nitrate* is made for X-ray work. It is inert in the stomach.

Bismuth in Bread and Milk in proportion of 1½ ounces of Bismuth Oxychloride to ½ pint of bread and milk to form a thick paste—not a liquid—is also employed and is in some respects **more suitable.**

In tuberculous joints Bismuth injections are useful for diagnosis and treatment.

See also Bismuth Carbonate *antea* and Radiology, Vol. II.

Pessaries or **Suppositories** may be made with Oil of Theobroma, containing 10 grains (**0·6 Gm.**).

Unguentum Bismuthi Oxychloridi.

Bismuth Oxychloride 1, White Soft Paraffin 15.

Is useful for anointing the speculum for vaginal examinations.

Unguentum Bismuthi Compositum, Plaistow.

Bismuth Oxychloride 2 drachms, Dilute Hydrocyanic Acid 20 minims, White Paraffin Ointment 1 ounce.

The **Oxyiodide** has been applied to ulcerating sores and injected as suspension, 1 in 100 of water for gonorrhœa; also as an ointment for rectal affections. Internally for ulcer of the stomach.

Bismuthi Salicylas, Bismuth Oxysalicylate, or Subsalicylate, $C_6H_4.OH.COO.BiO=362·039$ (*B.P.* '14). **U.S., Jap., P. Ital. V., P.G. VI., P. Belg. IV., Ph. Ned. V. and P. Helv.** (last two with method of making).

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white powder, insoluble in Water, Alcohol, and Glycerin, yields on incineration about 64% of Bismuth Oxide. Useful in some forms of diarrhœa, typhoid fever and gastric catarrh, and as a substitute for Iodoform. A good intestinal antiseptic.

Bismuth Salicylate Sterules, 2 grains (**0·12 Gm.**) in 1 Cc. of Sterile Olive Oil are prepared.

Syphilis well treated. Better tolerated than Mercury. Can be used in cases with marked renal involvement.—Per Jl. A.M.A. ii./25,223.

Criticism is, however, that this insoluble compound is dangerous by injection.

Ref. under Sodium Potassium Bismuthyl Tartrate.

✱**Bismogenol** (T.M. 444974) in syphilis. A suspension of a Bismuth compound of a 'highly valent Oxybenzoic Acid'—'possibly Bismuth Salicylate'—in Olive Oil.—H. Ritter and C. L. Karrenberg, L. ii./29,971.

For Notes on Chemical Examination, see Vol. II.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 4.

Suppositories of Bismuth Salicylate. 10 grains in each.

A useful astringent in dysentery.

Bismuthum Subsalicylicum, Basic (Fr. Cx.).

$C_6H_4.OH.COO.Bi(OH)_2 = 380{\cdot}0546$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

An amorphous anhydrous insoluble white powder neutral to Litmus incompatible with Acids. To prepare, warm without boiling Hydrated Bismuth Oxide (*q.v.*) 158 or as much as corresponds to 150 Gm. Bi_2O_3 with Salicylic Acid 100 previously mixed with water 1,000. The mixture should be finally slightly acid. After cooling collect and wash rapidly, and dry at not exceeding 80° C. In an experimental quantity which we prepared we found a distinct proportion of free Salicylic Acid.

Bismuthi et Cerii Salicylas.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

For sickness, diarrhœa, dysentery, and ulceration of the bowels.

Bismuthi Sulphocarbolas *vel* **Sulphophenas.**

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**) in cachets.

A red-tinted slightly soluble powder used in intestinal affections.

Bismuthi Subnitras, Bismuth Oxynitrate, Magisterium Bismuth (*B.P.* '14), **Ph. Ned. V.**, P. Helv., P. Ital. V., P.G. VI.

$BiONO_3H_2O = 305{\cdot}0236$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

P. Jap. gives method of making—*i.e.*, Bismuth 1, Nitric Acid (1·2 Sp. Gr.) 5 solve and allow to crystallise, then take the crystals 1, water 4, and add boiling water 21. Pour off, wash with water 25, and dry at 30° C.

Yields (*B.P.* '14, P. Jap. and P. Ital.) 79 to 82% Bi_2O_3.

For pharmaceutical purposes it is usually $6Bi_2O_3.5N_2O_5.9H_2O$ (79·8% Bi_2O_3).—C. E. Corfield and G. Short, P.J. ii./24,80.

Incompatible with alkaline carbonates, also decomposes Potassium Iodide, and incompatible with Tannin and Sulphur.

Best suspended in aqueous vehicle by Compound Tragacanth Powder, 1 drachm to 8 ounces, or by powdered Gum Acacia or with half its weight of Starch Powder.—P.J. i./26,96.

Uses.—In gastric ulcer and dysentery as an intestinal antiseptic and occasionally as a dusting powder in eye work. During the war it was much used to wounds in the form of 'B.I.P.P.'

Gastric ulcer well treated by Bismuth Subnitrate rubbed into a paste with Liquid Paraffin,—a good vehicle for Bismuth, undoing its constipating effect. Decomposition into nitrite in the stomach is avoided. *cf.* Bismuth Carbonate.—L. J. Picton, B.M.J. ii./17,617

As a dusting powder for wounds it has caused poisoning.

Syphilis.—Bismuth Subnitrate as effective as any other Bismuth compound. Good results with following injection: Bismuth Subnitrate 10 Gm., Novocain Nitaate 1 Gm., Sterile Almond Oil 100 Gm., the dose being 1 Cc. (0·07 Gm. Bismuth) every third day.—E. Sonnenberg, D.M.W.; per Pres., Sept. '26,329

Hypertension.—Bismuth Subnitrate assists materially in obtaining reduction of arterial tension, owing to breaking the vicious circle of vascular fatigue, hyperirritability, with more spasticity and fatigue, and thereby permitting of physiologic rest.—E. J. Stieglitz, Jl. Pharm. and Exp. Therap. Dec., '28,422.

jectio Bismuthi Subnitratis.—BECK'S BISMUTH PASTE. For X-ray Examination of fistulæ (*cf.* also Bismuth Oxychloride).

(*a*) For DIAGNOSIS AND EARLY TREATMENT.—Place Bismuth ıbnitrate 1 in a mortar sterilised by burning a little spirit in it ıd add in portions hot melted Soft White Paraffin 2.

(*b*) FOR LATE TREATMENT.—Bismuth Subnitrate 6, White Wax 1, ard Paraffin 1 (M.pt. 120° F.), Soft White Paraffin 12. Prepare on nilar lines to the last.

The (*a*) form was originally injected to diagnose the extent of ronic tuberculous sinuses. It was found also to have curative fect. It is melted before use. The (glass) syringe must be sterilised y and the plunger dipped in sterile oil before charging.—Beck, 'Fistulous Tracts, Tuberculous Sinuses and Abscess Cavities.'

The following is a modification:—Bismuth Oxychloride 1, Soft hite Paraffin 1½, Liquid Paraffin 1½, for injection into sinuses.

By X-ray examination, sinuses can be localised. Large quantities should t be left *in situ*.

Three ounces of (*a*) injected at the knee, and later 4 ounces further caused isonous effects. Caution is necessary when using for diagnostic purposes.

The Bismuth is bactericidal, chemotactic and astringent. Mechanical tion is also good.

ısta Bismuthi et Iodoformi. *Syn.* **"B.I.P.P."**

Mix Bismuth Subnitrate 1, and Iodoform 2, stir in Liquid Paraffin 1 *q.s.* to a soft cream, and rub down on a slab with a spatula.

A Paraffin Base of composition: Paraffin melting point 45° C. parts, and Liquid Paraffin (Sp. Gr. 0·880) 40 parts suggested when aking a *soft* "B.I.P.P."—S. Dunstan, B.M.J. ii./17,505.

Large infected wounds have been treated without special drainage, ey can be closed by sutures at any period and the dressings can be t on one to six weeks with a knowledge that they are making progress. *Smear the surface of wounds* and rub in "B.I.P.P.," *removing any cess.*

In dressing a wound—

(i.) Clean with Carbolic Lotion and cleanse, if possible, with dry sterile gauze mops.

(ii.) Mop out with cotton-wool mops soaked in Spirit and dry.

(iii.) Apply 'B.I.P.P.', in thin covering over the wounded surface. Dress in the usual way. This requires no change for days or weeks if patient is free from pain. If discharge comes through, the stained part must be soaked in spirit and a gauze dressing applied as a further covering.

iv.) In redressing, the wound is cleaned with spirit.

For fresh wounds, when infective gangrene is still a possibility, free drainage ıst be employed. The method makes possible the healing by first intention der infrequent dressings. Acute abscesses opened, cleaned, filled with .I.P.P.', and closed by interrupted sutures can heal without further pus mation.—Rutherford Morison, L. ii./16,268.

The fresher the wound is the better it reacts to the treatment. Thick sterile k sutures rubbed all over with 'B.I.P.P.' are better than silkworm-gut. mpound fractures of all the bones can be treated with as great ease as ıple fractures. Cases of compound fracture of ankle, gun-shot and other unds well reported on.—Rutherford Morison, B.M.J. ii./17,503.

It combines a maximum amount of rest to the wound, a persistent storage inhibitory antiseptic and a minimum amount of attention, but is not free m risks.—Sir G. H. Makins, B.M.J. i./17,216; L. i./17,252.

OSTEOMYELITIS.—The more frequent use of 'B.I.P.P.' urged in treatment. B.M.J.E. i./26,20.

TROPICAL ULCER well treated.—T. R. E. Kerby, L. i./32,237.

B.I.P.P. modified.—Bismuth Subnitrate 1, Iodoform 2, and Soft Paraffin 13 Good in appendicitis operations, but some say would never introduce it into the abdomen.—R. A. Stoney, B.M.J. ii./30,737.
See also '**Wounds.**'—Therapeutic Index.

Enema Bismuthi et Sodii Salicylatis.

Bismuth Subnitrate 3 drachms, Sodium Salicylate 2½ drachms, Psyllium Seed Mucilage to 1 pint.

Colitis the treatment of, by Revellied's method (modified).

Empty the bowels by enemata of warm water twice daily for three days—on the fourth day inject the above. Action of the bowels must be discouraged after the injection, as the medicament should be retained for two days, if possible, to permit of absorption.

During the injection the patient should lie upon the left side with the pelvis raised 2 or 3 inches. This treatment has, of course, no effect upon enteritis alone or complicating (? originating) colitis; consequently a modification is necessary.

Pilula Bismuthi-Sodii Salicylatis cum Salol.

Syn. Compound Bismuth Pill.

Dose.—Two immediately after each of 6 consecutive meals, then discontinue for two days and repeat in the same manner.

This pill contains in the centre Bismuth Carbonate 2½ grains, coated thinly with Gelatin, and around this is a layer of Sodium Salicylate 2 grains, covered finally with Salol 1½, 2½ or 3 grains, or as desired (*the Salol to be applied pure by means of heat only*).

It was devised to ensure its reaching the part of the intestine affected by the catarrh. It is coated with acid-resisting material and it dissociates on meeting the alkaline intestinal juice. The well-known coating effect of the Bismuth Carbonate on the inflamed mucous surfaces is enhanced by the Sodium Salicylate. The Bismuth remains *in situ* for from 8—10 days.

Bismuth Subnitrate Tablets are made 5 to 10 grains.

℗ Lotio Bismuthi Mid. H.

Bismuth Subnitrate 5, Zinc Oxide 20, Mercuric Choride 0·16 Glycerin 10, Hydrogen Peroxide Solution 120, Water to 300

As a stimulant in rosacea and pigmentary disorders.

℞ ℙ1 Pulvis Bismuthi cum Morphina. *Syn.* Insufflatio Bismuthi et Morphinæ. Ferrier's Snuff.

Bismuth Subnitrate 180, Morphine Hydrochloride 1, Powdered Gum Acacia 60.

From 1 to 2 drachms may be used as snuff in 24 hours for catarrh. For acute coryza add powdered cubebs. It may cause drowsiness for some hours in susceptible patients

℞ ℙ1 Unguentum Bismuthi cum Cocaina, St. Mark's H.

Bismuth Subnitrate 120 grains, Cocaine Hydrochloride 8 grains, Soft White Paraffin to 1 ounce.

Bismuthi Oxy-Iodogallas. P. Jap. IV., P. Helv., Ph. Ned. V., P.G. VI.

$C_6H_2(OH)_3COOBi.OH.I = 521·7788$.

★Airol (T.M. 181257 of 1894). Renewed 1922. *Syns.* Airoform, Airogen.

Manufacture (from specification of expired Patent). Bismuth oxyiodide derived from 9·5 kilos of Cryst. Bismuth Nitrate is washed and stirred with water. 3·4 kilos Gallic Acid are added until red colour changes to greyish-green. Collect, wash and dry at moderate heat. Or, Bismuth Gallate (Dermatol), 10 kilos are treated under heating with 3·1 kilos of Hydriodic Acid until of green colour. Wash and dry.

A light greyish-green powder, odourless, non-irritant. Used as ıtment for ulcers, boils, whitlows, chancres, and intertrigo. Also dusting powder, *e.g.*, for gonorrhœal ophthalmia.

ppositoria Hæmorrhoidalia.
Bismuth oxyiodogallate 6, Resorcin 1·5, Zinc Oxide 6, Balsam of Peru 1·5, llow Beeswax 0·0075, Sesame Oil 1·5, Oil of Theobroma 19 Gm. Divide o twelve suppositories.

Anusol Suppositories (T.M. 226005 and 455228).
Contain Bismuth Oxyiodide, Bismuth Resorcin Sulphonate, Zinc Oxide, lsam of Peru, in a fatty base. For hæmorrhoids.

Sanusin✱ Sempules (T.M. 329438) contain Resorcin, Boric Acid, Balsam ru, Zinc and Bismuth Carbonate—useful in treatment of hæmorrhoids.

smuthi Subgallas, $C_6H_2.(OH)_3CO.O.(BiO),H_2O$ or $Bi(OH)_2C_7H_5O_5$ =412·0546. *Syn.* ✱Dermatol; U.S.X. 52–57% Bi_2O_3. P. Jap. Ph. Ned. V., P. Ital. V., and P. Helv. Gallate de Bismuth. Fr. Cx. 56·45% Bi_2O_3 (with directions for making). P.G. VI and P. Belg. IV. (46·6% Bismuth), F.E. VIII. (52—57%).

Patent 6234 of 1891 became void in the 11th year. Now public operty. ✱Dermatol (T.M. 215949).

Manufacture.—Bismuth Carbonate 258 and Gallic Acid 188 are ıted in presence of Water 2,000, until interaction has occurred. The colour is lemon yellow and the Bi_2O_3 content we find approximates ory—56·4%.—W. H. M., 1917.

The Fr. Cx. method is also satisfactory: Dissolve Bismuth Nitrate *Cryst.*) Gm. in Glacial Acetic Acid 200 Gm. Dilute with water 500 Cc. and add h stirring Gallic Acid 37 dissolved in water 1,500 Cc. Wash the p.p. until liquor is no longer acid to litmus. Dry at not exceeding 60° C. P. Ital. thod is similar.

Average dose (U.S.)—15 grains (**1 Gm.**).

An odourless, yellow, insoluble, non-irritant antiseptic dusting wder, employed alone or with starch.

Incompatible with alkaline Sulphur compounds.

Given internally for diarrhœa in doses of 30 to 90 grains daily. nulsion of Bismuth Subgallate 2, Gum Acacia 2, Water 25, has en used in gonorrhœa, with good results.

In ulcerative colitis an emulsion may be used to adhere to the ucosa; also of value after pile operations. Promotes healing.—. S. Handley.

Yaws.—Dermatol intramuscularly gave as good results as the Arsenics.—r Jl. Trop. Med., Jan. 15/25,35.

llapsible Tubes, with catheter attachment, of **Bismuth Subgallate Ointment,** 10%, with paraffin basis, are useful in gonorrhœa; this ointment is also good for burns and eczema.

rbassus Bismuthi Subgallatis. Bismuth Subgallate Gauze. To prepare, use an emulsion of Bismuth Subgallate, ½ to 1 of Glycerin to 2 of Alcohol (90%) and proceed in the customary manner (*cf.* erilised Dressings)—the final strength being 10 to 20% of the smuth in the gauze as required. For packing cavities.

smuthi Tannas. *Dose.*—10 to 30 grains (**0·6 to 2 Gm.**).

A yellow powder insoluble in water, is astringent, and useful in arrhœa and dysentery.

smutose (*cf.* German patent 117269). *Dose.*—15 to 30 grains for children, adults by the teaspoonful. A compound containing about 20% of Bismuth with 60% of Albumen; useful in gastric ailments.

Naphthol-Bismuth. Basic Bismuth Beta-Naphtholate.

$Bi_2O_2(OH)C_{10}H_7O = 610{\cdot}0624$.

Syn. ✱Orphol (Trade Mark 190732.)

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Manufacture:

We have made a compound of this kind by interaction of a Sodium Naphtholate solution made with Beta Naphthol 144 (one molecule) and Sodium Hydrate 120 (three molecules) with Bismuth Citrate 397 (one molecule) in the form of a paste with water.

This method produces a light buff coloured powder, which gave on ignition approx. 80% Bismuth Oxide. Theory demands 76.3%.

A useful antiseptic to the stomach and intestines, astringent.

Phenol-Bismuth.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Preparation:—

The method advised is to dissolve Bismuth Oxynitrate 60, in 70% Nitric Acid 45, diluted with water 150, and to add this very slowly to Sodium Hydroxide 42 and Phenol 20 in water 750 with stirring and wash with cold water. The body obtained yielded on analysis 14·76% Phenol and 81·93% Bismuth Oxide. The exact formula of the compound is therefore uncertain. Products with the highest Phenol content are obtained by precipitation from neutral solution in the cold. The figures do not agree with $Bi(OH)_2C_6H_5O$.—C. E. Corfield and G. R. Boyes, P.J. i./21,483.

A white powder, insoluble, containing about 20% of Phenol, combined with bismuth oxide. Acts slowly on the digestive tract and does not cause carboluria. Has a similar action to last preparation.

Pyrogallol-Bismuth. $C_6H_3 \begin{cases} (OH)_2 \\ O.BiO \end{cases}$ or

$C_6H_3(OH)O_2BiOH = 350{\cdot}039$ has internal action similar to Salol.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

ALKALI BISMUTHYL TARTRATES.

The **Alkali Bismuthyl Tartrates** may be divided according to method of making and use. (*cf.* Corfield and Adams, P.J. ii./23,82.)

(1) 'Neutral' compounds, termed '**Bismuthyl Tartrates,**' or '**Tartrobismuthates,**' which are either soluble or insoluble in water, ***for injection in protozoal diseases.*** They are made by dissolving Bismuth Oxy-Tartrate in alkali, the Alkali Bismuthyl Tartrate resulting by evaporation or by precipitation with Alcohol.

(2) 'Acid' preparations, described as 'Bismuth Tartrate Soluble,' in scales giving an acid solution. These are used with Pepsin for digestive complaints. They are made by treating Bismuth Hydroxide with a solution of the alkali acid tartrate, and evaporating.

Sodium Bismuthyl Tartrate, Neutral. *Syn.* Sodium Tartrobismuthate. ✱'Sobita' (T.M. 461385). ***For Injection.***

Dose.—As for Sodium Potassium Bismuthyl Tartrate *postea*.

Manufacture.—Bismuth Oxytartrate is first prepared by the method of R. C. Cowley (C.D. i./13,312). Dissolve Bismuth Subnitrate 70 Gm. in Nitric Acid (Sp. Gr. 1·42) 57 Cc. diluted with an equal volume of water, add Sodio-Potassium Tartrate 64·5 Gm. dissolved in a little water, then Sodium Bicarbonate 57 Gm., also in solution. Heat to drive off CO_2. Filter and thoroughly wash the precipitate of Bismuth Oxytartrate.

This gives a product which, when dried, contains only about ½% of Bismuth Subnitrate and has a Bismuth content of about 57%, corresponding

) the formula $Bi_2O(C_4H_4O_6)_2$. The washed precipitate of Bismuth Oxytar-ate is dissolved in 115 Cc. of 2 N/1 NaOH and the solution, after filtration, e find is best run into fifteen times its volume of 95% Alcohol to precipitate ne compound. The precipitate is collected and dried at 50° C.

We find that the substance so prepared corresponds approximately to the ormula $C_4H_4O_6$ (BiO) Na, but this agreement seems to be only accidental, nce the composition of the product can be altered by varying the strength f Alcohol used for precipitation. Thus it seems probable that the substance s in reality either more complex, or else a mixture of several compounds. ther workers have arrived at a similar conclusion.

R. C. Cowley (*loc. cit.*) dissolves the Bismuth Oxytartrate in normal Caustic oda, evaporates and scales. On experimenting, we find the Alcohol precipi-ation preferable, since evaporation gives an insoluble product, which only ives a clear solution on the addition of a little more alkali.

The compound occurs as a white powder, ***soluble*** 1 in 6 parts f water, giving a nearly neutral solution, and containing about 3% of Bismuth.

Uses.—As under Sodium Potassium Bismuthyl Tartrate.

odium Bismuth Tartrate, Acid. *Syn.* BISMUTH TARTRATE SOLUBLE.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) *per os.*

Manufacture.—By either hot or cold digestion of freshly precipi-ated Bismuth Hydroxide with Sodium Acid Tartrate, the solution being then aled. In no case could a neutral compound analogous with Tartar Emetic e isolated, the resulting preparation always contains Sodium Acid Tartrate. *ee also* S. Webster Jones and A. J. Jones, P.J. ii./31,76.

Colourless scales with acid reaction. Commercial samples xamined contained from 30—45% of Bismuth, and from 15—25% f Sodium Acid Tartrate, calculated from the acidity.

Uses.—For digestive complaints, in conjunction with Pepsin, he acid solution favouring the action of the enzyme with which, we nd, it is compatible in moderate amount.

iquor Bismuthi Tartratis.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve Bismuth Tartrate Soluble 1040 grains, in water 10 ounces, nd Chloroform 20 minims, in Alcohol 40 minims, mix and make up o 20 ounces.—T. D. Morson and J. Harpham, C.D. ii./12,947.

otassium Bismuthyl Tartrates.

These are similar to the corresponding Sodium salts and are pre-ared by similar methods.

'Neutral' Potassium Bismuthyl Tartrate is a white soluble owder containing about 50% of Bismuth.

'Acid' Potassium Bismuthyl Tartrate is obtainable in scales ontaining about 38% Bismuth, and acidity equivalent to 10 to 15% f Potassium Acid Tartrate.

odium Potassium Bismuthyl Tartrate. *Syn.* SODIUM POTASSIUM TARTROBISMUTHATE.

This substance occurs almost exclusively in the form of the water oluble, neutral preparation used for injection purposes.

Dose.—3 grains (**0·2 Gm.**) *intramuscularly* every 3 or 4 days, epeated until a total of 2 to 3 Gm. has been given. (The com-ound is given in 10% suspension in sterile Oil.) Subsequently a ingle weekly injection of 0·2 to 0·3 Gm. may be given, or the treat-ment may be suspended for a month and started again, if necessary.

Manufacture.—Commercial samples which we have examined show a considerable variation in the Bismuth content, ranging from 30 to 60%. By dissolving Bismuth Oxytartrate in a 2 N/1 solution of equimolecular parts of Caustic Soda and Potash with subsequent precipitation with Alcohol as described under Sodium Bismuthyl Tartrate, a preparation is obtained containing about 50—52% of Bismuth. The above method appears to give substances which are nearly uniform as regards Bismuth content, but as in the case of the corresponding Sodium Bismuthyl Tartrate the products are probably a mixture of complex compounds.

A white powder, ***soluble*** about 1 in 2 parts of water, giving a neutral solution.

Uses.—*This* is the compound used in syphilis, but the difference in effect between it and a body without the Potassium is no doubt negligible.

Pharmacology.—Sazerac and Levaditi found a dose of 0·01 Gm. per kilo of this body intramuscularly caused disappearance of the treponema from rabbits with experimental syphilis. Of the various compounds tried (Bismuth Citrate, Lactate, Subgallate, etc.) it gave the speediest results. Therapeutically, the treponema disappeared from a chancre after the second injection, with subsequent healing. In the secondary stage, eruptions or mucous patches clear up quickly. Very favourable results have been obtained in the tertiary stage.—Jl. des Praticiens, Feb. '22, per Pr. It has been much used both at home and abroad.

An extensive investigation into the toleration of animals towards injections of Bismuth in various forms. The soluble **Sodium Bismuth Citrate,** containing 65·8% Bismuth appeared to be less toxic in rabbits than Tartrate compounds.—C. S. Leonard, Jl. Ph. Exp. Ther., July '26,89—130.

Note on manufacture of Bismuth Sodium Citrate. Its solution can be boiled without decomposition.—Jl. Ph. & Exp. Ther., Sept., '27,353.

Bismuth intramuscularly, as the metal in Dextrose solution, or Potassium Tartrate or Salicylate in oil, Bismuth causes ***definite and prompt diuresis*** in human subjects.—Jl. A.M.A. ii./28,225.

Studies in the pharmacology of Bismuth salts.—C. S. Leonard, Jl. Pharm. and Exp. Therap., Dec. '28,333—364.

Intramuscularly 0·03 Gm. of Bismuth Sodium Tartrate causes prompt diuresis. More effective than insoluble products.—P. J. Hanzlik and co-workers, Jl. A.M.A. i./29,1416.

Caution. *Bismuth preparations, in general, are apt to cause gingivitis and stomatitis. Gingivitis is said to be less frequent with aqueous than with oily solutions. Care must be taken with the mouth.*

Bismuth medication causes local pain; avoided by use of suitable preparations and careful technique. Effects on the skin: a stomatitis may occur. Colitis and nephritis have occasionally been reported; also headache and depression.

Bismuth should not replace Arsenic in all cases, being specially indicated in cases resistant to, or intolerant of, Arsenic. Emory and Morin, Paris Med., Dec. 22, 509, per Pres., Feb. '23. The urine should be watched during treatment.—B.M.J.E. ii./22,58. Bismuth compounds contraindicated in heart disease, being liable to induce weakness and irregularity of action.—per Pres., Jan. '24,57.

Bismuth compounds in general are much less toxic intramuscularly than intravenously.—Raiziss & Severac, Arch. Derm. & Syph., Nov. '25,661.

Peripheral polyneuritis following injection of metallic Bismuth preparation. Risk of injections of Bismuth preparations when kidneys are damaged.—M. Critchley, Brit. Jl. Ven. Dis., Jan. '26,83, per Pres., Sept. '26,330.

Many cases of albuminuria recorded following Bismuth administration.—B.M.J.E. i./25,77.

Injections of metallic Bismuth are dangerous—probably true, though to ss extent, of Bismuth Oleate. Bismuth Salicylate is also dangerous, and hould be replaced by a more soluble salt, *e.g.*, Potassium Bismuth Tartrate ntragluteally once a week. Injection of insoluble Bismuth Salts twice weekly open to question, as only a small amount is absorbed at most and too fre-uent deposits may lead to cumulative action.—Per Jl. Trop. Med., June 1, 6,161. See also G. A. Masson, Jl. Ph. & Exp. Ther., Dec., '26,121.

Cowley's compound in 10% suspension in Olive Oil employed. Dose ntramuscularly 2 to 3 Cc. Soluble salts are at least 10 *times as toxic* when iven *intravenously* as when given *intramuscularly*. Liquor Bismuthi et mmon. Cit. B.P. 0·5 or 1 Cc. subcutaneously had no general effect, but on epetition a black line formed on the gums with sometimes a stomatitis. *ubcutaneous* injections are in general less safe than *intramuscular*. Intravenous njection, especially with 2 Cc., gave signs of poisoning, nausea and copious iuresis.—H. B. Day, L. ii./22,328.

Bismuth Sodium Tartrate and Bismuth Potassium Tartrate given in oil. *ntramuscular* injections to be given, not hypodermic or intravenous. Dose 2 Gm. every other day or 0·3 Gm. every three days. Total dose 1 to 1½ Gm. tomatitis seen, but milder than Mercurial.—Sazerac and Levaditi, B.M.J.E. /22,9. See also B.M.J. i./22,443.

The Bismuth is widely distributed and rapidly eliminated.

The Wassermann Reaction is changed.—L. i./23,39.

YAWS in Kenya Colony well treated.—R. Howard, T. Roy. S. Trop. Med., ar. '23,437.—C. R. Steel, Jl. Trop. Med., Nov. 1/27,274. There is a diffi-ulty in determining whether a case should be diagnosed as syphilis or yaws, he administration of Mercury will often clear up the doubt, as Mercury has o influence on yaws.—A. Castellani.

Bismuth Oxides must be used with caution. May produce abscesses. A ismuth course may consist of (a) a soluble compound in small repeated oses, (b) precipitated Bismuth metal in aqueous suspension, for rapid results, c) inorganic insoluble compounds, chiefly Iodoquinates for prolonged and onic treatment.—R. Barthelemy, Urol. & Cut. Rev., May, '26,310.

Tartro-bismuthate of Sodium and Potassium too painful for general use. ismuth slow in healing active signs of disease in comparison with Arsenic. ismuth thérapy superior to Mercury for primary, secondary and tertiary sions of syphilis, when either is combined with Arsenobenzol.—Maj. A. T. rost, Med. Soc. for Study of Ven. Dis., L. i./24,901.

'Bismutol' Sterules contain 3 grains (0·2 Gm.) of SODIUM POTASSIUM BISMUTHYL TARTRATE in 2 Cc. (30 minims) of sterile Oil. For use intramuscularly.

A Sodium Potassium Tartrobismuthate containing approximately 0% Bismuth and giving a neutral aqueous solution.

Alternatively 1 Cc. doses of 10% aqueous solution may be employed every or 3 days—the course being 10 to 20 injections.

CATARACT has been treated by injections of Bismutol.

EPILEPTIC MANIACS and allied sufferers in the Tanganyika Territory were ound to benefit from Sodium Potassium Bismuth Tartrate.—J. G. McNaughton, une 16, '29.

RELAPSING FEVER.

Sodium Potassium Bismuth Tartrate brings fever down. Given intra-nuscularly—for an adult, 2 injections of 0·2 Gm. in 2 Cc. Water, for a child f 2 to 10 years 2 injections each of 0·1 Gm. For a baby under 2 years, 1 njection of 0·1 Gm.—J. Todd, B.M.J. i./30,312.

Trepol is stated to be a preparation of similar composition.

Trepol is essentially basic Bismuth Carbonate and not Sodium Potassium Bismuth Tartrate, as stated. **Neotrepol**—the dose of metallic Bismuth in different ampoules was inexact. *Neither compounds admitted to N.N.R.*—Y.B.P., '26,223.

Said to cause rapid disappearance of the spirochætes in syphilitic chancres and healing of lesions in 6 to 20 days.—L. i./22,1001.

Good effects from intragluteal injections twice weekly of 1 to 2 Cc. of the 10% emulsion.—B.M.J.E. ii./22,73.

PSORIASIS successfully treated by intramuscular injections. Complete retrogression of lesions in 12 and partial retrogression in 9, out of 21 cases. No local treatment.—L. ii./26,559.

Normal Bismuth Tartrate, $Bi_2(C_4H_4O_6)_3 6H_2O = 970{\cdot}1872$.

Mix 70 Gm. Bismuth Oxynitrate and 55 Gm. of Tartaric Acid with 60 Cc. of Water, allow to stand until small portion soluble in Ammonia. Wash three times by decantation with 400 Cc. 0·375% Tartaric Acid solution. Filter and dry.—S. G. Stevenson, Qtrly. Jl. Ph., 2, '31,178.

℗ **Bismuthi Arsanilas.** $BiO.O.AsO(OH).C_6H_4.NH_2 = 440{\cdot}9926$.

A white powder containing 53% approx. Bismuth, calculated as Bi_2O_3 and 17% Arsenic.

The writer has prepared this compound for use in yaws and syphilis, by interaction between Bismuth Sodium Tartrate and Arsamin. It is best given in the following fresh precipitated and washed form:

℗ **Bismuth Arsanilate Suspension** 1 grain (0·06 Gm.) in 15 minims (1 Cc.).

Dose.—Intramuscularly for adults 2 to 3 Cc., for grown-up children 1 Cc., for young infants 0·5 Cc.

An injection consisting of 3 grains Bismuth Sodium Tartrate and 2 grains Soamin, in 1 Cc. water, given every 2nd day, almost invariably cleared up yaws in 6 days, and 75% of 538 cases of tertiary or congenital syphilis were completely healed in 12 days.—J. O. Shircore, L. ii./26,43.

300,000 cases of yaws treated with Bismuth since 1922. The Soamin and Bismuth Sodium Tartrate preparation costs less than a penny per dose.—J. O. Shircore, L. ii./26,43. Routine treatment for yaws in Kenya Colony—in two districts alone over 36,000 cases treated during 1923. Dose 3 grains intramuscularly in 2 Cc. Distilled Water: smaller dose for children. Enormous saving compared with Novarsenobenzol.—A. R. Paterson, Int. Conf. Trop. Am., '24,584.

Stovarsol compound of Bismuth, see Stovarsol.

Quinine Iodo-Bismuthate, FR. CX. Nouv. Supp. (1926), P. Belg. IV., F.E. VIII.

$(BiI_3)_2C_{20}H_{24}N_2O_2{\cdot}2HI = 1759{\cdot}6748$.

Method of preparation is given in all the above works.

SUSPENSION D'IODOBISMUTHATE DE QUININE, FR. CX. Supp. (1926).

Sterilise the pestle and mortar by burning a little spirit in the latter, and incorporate Quinine Iodobismuthate, 17 Gm., with Anhydrous Wool Fat 5 Gm., and Neutral Olive Oil 87 Gm., making up to 100 Cc.

Quinine Iodobismuthate Sterules are prepared containing 1 Cc., *i.e.*, 0·17 Gm., corresponding to 0·04 Gm., Bismuth. The dose has also been prepared in 2 and in 4 Cc.

Iodo-bismuthate of Quinine gave good results in some cases apparently drug-fast to Arsenic and Mercury.—Col. E. T. Burke, L. i./24,902. Good results confirmed.—Margaret Rorke, *ibid.*

✱ **Bi-Quinyl** (T.M. 440714). Is also a double Iodide of Quinine and Bismuth.

Dose.—Each ampoule contains 0·3 Gm. of the compound in 3 Cc. of oil. Adult dose, one ampoule every 3 days up to 15 or 20 injections. This constitutes a course of treatment, to be repeated after intervals of 10 days.

The combination of Quinine and Iodine with the Bismuth is thought to enhance the spirillocide action, especially in all stages of syphilitic infection.

✱ **Spirobismol** (T.M. 490555). *Syn.* TARTRO-QUINIOBINE is a similar combination.

Oil-soluble Bismuth Salts from, *e.g.* DIPROPYL-CARBINYL MALONIC ESTER AND BISMUTH-NITRATE subject of Patent 356,550.—P.J. ii./31,509.

BROMUM.

Br=79·916.

A dark brown liquid, Sp. Gr. 2·99, with penetrating odour. Soluble in 30 of water. Is not used as such medicinally. Since the war romine has been made in large quantities in France from sea water. **Imperial Bromine** made from the Dead Sea has recently come on the market.

ntidote to the fumes of—

Alcohol inhalation is good, *see also* Chlorine and Irritant Gases under ntidotes.

romine Sterules for urea estimation, **1, 2·2 and 4 Cc.** and *Liquor Bromi, vide Vol. II.*

alcii Bromidum. U.S. $CaBr_2$=199·912.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**).

A white crystalline powder soluble 1 in 0·3 of water and about 1 n 0·6 of alcohol 90%.

Fr. Cx. Nouv. Supp. (1926), allows 20 to 25% of water. This salt is obained by solidification of the molten mass in its water of crystallization.

Flavoring.—Syl or Glyl Menthæ Piperitæ, Syl Limonis (bold lose), Syrupus Aromaticus.

Epilepsy treated with good results. Frequency and intensity of fits is iminished—effective in half the dose of Potassium Bromide. Mental activity ncreases and general health improves. Effect marked if patient previously n Potassium Bromide.—A. Humphrey Davy, B.M.J. ii./15,692. A. G. Auld oints out the relative content of Bromine in the two salts. The effect is nevertheless, in his opinion, due to the Calcium.—*ibid.* p. 765; see also *ibid.* op. 876, 909.

Asthma, hay fever, and anaphylactic shock treated with Calcium Bromide intravenously; also infections such as typhus. Prevents postoperative bleeding in obstructive jaundice. Intravenously more useful than orally in tetany following excision of goitre.—Jl. Intrav. Therap., Jan., '26,5.

Magnesii Bromidum, $MgBr_2+6H_2O$=292·2456.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**).

Contains 54·9% of Bromine. Given in hysteria and epilepsy as a nervine sedative. Soluble 1 in 0·6 of water and 1 in 2 of alcohol 90%.

Manganesii Bromidum, $MnBr_2+4H_2O$=286·8244.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Contains 55·7% of Bromine, and is given as a nervine tonic. It is soluble 1 in less than 1 of water and alcohol. Both of these may contain less water of crystallisation.

Bromal Hydras, $CBr_3.COH.H_2O$=298·7714.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) at bedtime.

In large colourless crystals, which melt on the hand, soluble in water 1 in $2\frac{1}{2}$. Applied externally it irritates the skin. It has been tried in epilepsy, chorea and insomnia.

Brominoleum, Brominol (33%).—*Martindale.*

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**) approximately equivalent in content of Bromine to 5 to 30 grains Potassium Bromide.

An additive compound of Bromine and Sesame Oil, containing $33\frac{1}{3}$% of the halogen in form of a thick brown odourless oil, Sp. Gr. 1·31. Gradually liberates Bromine to the system.

Uses.—In epilepsy and all forms of nerve troubles, also in headache and sea-sickness. May also be rubbed into the skin if diluted with an equal weight of Lanolin Ointment.

It may be taken internally shaken up with an equal volume of syrup, in beer, wine or milk, or dispensed as follows : Brominol 33% 2 ounces, Gum Acacia 1 ounce, Chloroform 18 drops, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. *Dose.*—2 drachms equal 20 grains Potassium Bromide.

Brominol containing 10% of Bromine is also prepared.

A dose of $\frac{1}{4}$ ounce of this equals approximately 20 grains of Potassium Bromide. Sp. Gr. 1·045.

Capsules contain 2 Gm. of 33% Brominol in each, equivalent to 15 grains (**1 Gm.**) Potassium Bromide.

℗ **Mistura Brominol cum Nuce Vomica.** Brominol 30 grains, Gum Acacia 30 grains, Tincture of Nux Vomica 6 minims, Spirit of Chloroform 15 minims, Water to $\frac{1}{2}$ an ounce. For one average dose.

The urine from patients under Brominol treatment contains small quantities of Bromine in combination, and the fæces contain traces.—W. H. M.

Brominol Tablets are prepared, each equivalent to 9 grains of Potassium Bromide.

Brom-Albumen. *Syn.* BROMO-PROTEIN.

Dose.—10 grains (**0·6 Gm.**)=$\frac{3}{4}$ grain Bromine approx.—increased as desired.

Contains 7% Bromine, combined with albumen, made by interaction of Bromine with Egg Albumen, in form of a light brown powder. As a substitute for Alkaline Bromides in epilepsy, where larger doses than the above may be required. It is hardly soluble in 0·2% Hydrochloric Acid, even in presence of Pepsin, but is readily dissolved in 0·5% Sodium Bicarbonate in the presence of Pancreatin, hence absorption takes place in the intestines.

Bromoform, P. Helv., Fr. Cx., P. Ital. V., Ph. Ned. V., P. Belg. IV., F.E. VIII. $CHBr_3$=252·7558.

Dose.—$\frac{1}{2}$ to 2 minims (**0·03 to 0·12 Cc.**) or more. P.G.VI. and FR. Cx. maximum single dose 0·5 Gm. ; max. during 24 hours $1\frac{1}{2}$ Gm. (=8 minims approx.). Children as many drops as years old—up to 6.

A limpid, colourless, sweet liquid, with an agreeable odour ; Sp. Gr. 2·829 to 2·833, B.pt. 148° C. Soluble in alcohol 90% in all proportions, slightly in water, decomposed by light. It should be preserved by addition of 0·5 to 1% alcohol. Is a powerful sedative, useful in insane cases. **Capsules** contain $\frac{1}{2}$ minim (**0·03 Cc.**) dissolved in oil.

Aqua Bromoformi. Well shaken, 1 minim is dissolved in 2 ounces of water. *Dose.*—1 to 4 ounces (**30 to 120 Cc.**).

For sea-sickness half doses occasionally.

Syrupus Bromoformi. *Dose.*—$\frac{1}{4}$ to 1 ounce (**8 to 30 Cc.**)=$\frac{1}{2}$ to 2 minims of Bromoform. To be diluted with an equal quantity of water or more, *at time of taking.*

Bromoform 2 minims, Alcohol 90%, 80 minims, Syrup 160 minims, Glycerin $\frac{1}{2}$ ounce.

The Sirop of the Fr. Cx. Nouv. Supp. 26, is Bromoform 1, Alcohol 90% 9, Glycerin 30, Syrup 160.

Uses.—In whooping cough diminishes number, duration, and severity of attacks, and mucous secretion is more easily got rid of.

℗ ✱**Rami** (T.M. 245697) **Syrup.** *Dose.*—Adult, 1 tablespoonful to 5 times a day : Children over 5, 1 teaspoonful 3 to 5 times daily. hildren under 5, 15 minims diluted, every hour or ½ hour according o age. *Contains* '*per* (*tablespoon*) *dose*,' Alcoolature d'Aconit 3 rops, Codeine 0·01 Gm., Bromoform 2 drops, Tolu 0·05 Gm.

yrupus Bromoformi Compositus. P.Ital.V.

20 Gm. contain 0·02 Gm. Bromoform, 0·01 Gm. Codeine, and 0·04 Gm. conite Tincture. Is similar to the last mentioned. (Tincture of Aconite . Ital. is 0·05% Alkaloids and hence approx. *B.P.*)

rometone. Tri-brom-tertiary Butyl Alcohol.

$C_4H_7OBr_3$=310·8026. *Dose.*—5 grains (**0·3 Gm.**), repeated 2 or 3 mes during 24 hours.

White crystals melting at 167° C. containing about 77% Bromine. ***oluble*** in alcohol, slightly in cold water.

Uses.—Hypnotic, analgesic, antiseptic. Useful in sea-sickness **Capsules of Brometone,** 5 grains in each.

In epilepsy, in some cases, of value and has some hypnotic power.

Large doses may produce dizziness, loss of appetite, and mental eaviness.—H_2

Avertin. *Syn.* **Tribromethylalcohol** or **E.107.** CBr_3CH_2OH= 32·7714.

A new anæsthetic, stated to have been first made by reduction f Bromal (1926). It is the subject of German Patent 437,160. White crystals containing 85% Bromine.

Soluble 3 in 100 of water at 37° C., also 1 Gm. in 1 Cc. of mylene Hydrate, in which form it is issued ('**Averatin Fluid**') : his is miscible with water. Solutions must be made without heat.

Dose.—0·1 Gm. per kilo is safest, but for exhausted patients hose Glycogen reserves are diminished and powers of detoxicating vertin are impaired, 0·08 Gm. Maximum dose, apart from weight,) Gm. The solution is administered in 2·5 to 3% aqueous solution er rectum (by gravity). It is non-irritant to the mucosa. Surgical næsthesia can be superimposed.

Reaction of the solution must be determined by adding 2 drops of in 1,000 solution of Congo Red to 5 Cc. of Avertin solution. The range colour should be unchanged.

No great change occurs in the patient for 10 to 15 minutes after he dose. Respiration then becomes slow and shallow, and slight anosis may be noticed. Another anæsthetic may be required in ldition.—F. B. Parsons, B.M.J. ii./30,554.

The use of this preparation, especially as a ***Basal Hypnotic,*** as been much discussed. The following remarks are in approxiately *chronological order.*

References.

Early Refs.—L. i./27,1037,1267.

Now made synthetically. In only 40 to 50% of cases is full anæsthesia ssured by its use alone. Liquid diet only to be given the night before operaon. Narcosis lasts 2 to 4 hours. Of value in operations on thorax and pper respiratory tract and in cranial surgery.—B.M.J.E. i./28,3.

As rectal anæsthetic used 100,000 times in Germany, but 'its advantages re not yet finally determined on a basis of security.'—L. ii./28,1141.

Used safely. J. Blomfield and F. E. Shipway, L. i./29,546.

Non-recovery from Avertin.—L. i./29,1365.

Induction of anæsthesia gradual. Only a small quantity of inhalation anæsthesia wanted to complete.—G. Edwards, L. ii./29,826.

For reduction of fractures, in combination with local anæsthesia it is ideal.—B. Hughes, B.M.J. i./29,898.—L. ii./29,1220.

Used 2½ years in combination with other drugs, themselves not anæsthetics but rather amnesics, with big fall in mortality rate.—B. Hughes, B.M.J. ii./30,887.

A review of literature.—Pres., Apl., '29,139. Discussion.—L. ii./29,978.

Decomposition products formed by the action of heat (over 50° C.), light, and air are irritant to the rectal mucosa. In anæsthetic doses it has no effect on the cardio-vascular system, but in larger doses it slows the rate and weakens the force of the heart-beat—coronary vessels dilate and blood pressure falls. Toxic doses cause death by respiratory paralysis. It is excreted in the urine over a period of several days—more than 50% in the first 24 hours.—F. B. Parsons, B.M.J. ii./29,712. See also G. Edwards, *ibid.* 713.

In Childbirth advocated for safety, ease of administration, and mitigation of pain. It is given at second stage pains after Morphine ¼ grain at first (sometimes a further 1/6 grain). There must be ***2 hours' interval between Morphine and Avertin.*** Should be given when the cervix is fully half dilated, if the contractions are strong and regular. Some excitement may follow for 5 minutes. *Dose.*—0·075 *Cc. Avertin Fluid per kilo weight, e.g.,* 4·5 Cc. for a *person of* 9 *stone* (60 *kilos*), *given per rectum in* 1,000 *Cc. warm water—milk has been used in preference.*—Prof. Martin. The method eases pains of labour.—J. S. M. Connell, L. ii./30,184.

Intravenous Use.—B.M.J. ii./30,527. See also L. i./27,1037.

Given under the ***guise of an 'enema'***—4·5 Cc. in 188 Cc. of water. In 10 minutes patient was snoring and an abdominal operation conducted—short circuit of intestine. During operation 2½ drachms of Chloroform-Ether given, to facilitate closing of the peritoneum.—J. Blomfield, L. ii./30,689.

Where there is serious pulmonary disease, Avertin advised: in combination with local anæsthetic or gas and Oxygen it is said to be ideal.—Sir F. E. Shipway, B.M.J. ii. 30,663.

Being superseded by Sodium Amytal.—F. B. Parsons, B.M.J. ii./30,756. See also Sir F. E. Shipway, *ibid.* 799.

Breathing with difficulty and some cyanosis.—E. J. Chambers, B.M.J. i./31, 35.

As a basal hypnotic, per rectum, 0·1 Gm. per kilo in 2·5% solution.—I. W. Magill, L. i./31,353. Preferable to Paraldehyde, especially for children.—Sir F. E. Shipway, *ibid.* 354. Valuable in ear, nose, and throat operations.—Sir J. Dundas-Grant, *ibid.*

Gynæcology—1,000 operations without deleterious effects. Safe in doses not exceeding 0·1 Gm. per kilo.—J. Young, L. i./30,1177; B.M.J. ii./31,1028.

Contraindicated in renal disease—no adequate margin of safety between surgical anæsthesia and death.—J. R. Veal and Co-workers, Jl. Pharm. & Exp. Therap., Dec. '31,643.

For a résumé on Organic Bromine Compounds with comparison of the quantity of Bromine in daily doses vide Vol. II.

BUTYL-CHLORAL HYDRAS.

Syn. Trichlorbutylidene Glycol. (*B.P.* '14.) Croton-Chloral Hydrate (formerly so-called), $CH_3.CHCl.CCl_2,CH(OH)_2$= 193·4256.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**), in pills or cachets.

This body is produced by the addition of water to liquid Butyl Chloral which is the final product of the action of Chlorine on Aldehyde. In pearly-white crystalline scales with pungent odour resembling that of Chloral Hydrate, and an acrid, nauseous taste. ***Soluble*** 1 in 43 of cold water; freely in alcohol, 1 in 1 of Glycerin, and Olive Oil 1 in 20.

Incompatible with alcohol. Butyl-Chloral Alcoholate will be formed, and in case of some mixtures will be precipitated.

Menthol 2, with Butyl Chloral Hydrate 1 part, liquefy. Combines also with Phenazone, *q.v.*

Flavoring.—Syl Menthæ Piperitæ; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In combination with Phenazone, Cannabis, or Gelsemium, Butyl-Chloral is useful in migraine; neuralgia of nerves other than the cranial are rarely benefited.

Antidotes.—Stomach tube, emetic, Coffee, Caffeine, Atropine.

Mistura Butyl-Chloral.

Butyl-Chloral Hydrate 4 grains, Glycerin 15 minims, Water to 1 ounce.

Pilula Butyl-Chloral. 3 grains (**0·2 Gm.**) or more.

Dose.—1 every 2 hours, or hourly.

℗ **Pilula Butyl-Chloral cum Gelseminina.**—Neuralgic Pills.

Gelseminine Hydrochloride $\frac{1}{200}$ grain (**0·0003 Gm.**) is added to each of the above. ℗ **Tablets** are also prepared.

For facial neuralgia two at the outset followed by one hourly until six have been taken.

℗ **Pilula Butyl-Chloral cum Camphora et Gelsemio.**

Butyl Chloral Hydrate 2 grains, Camphor 1 grain, Alcoholic Extract of Gelsemium $\frac{1}{4}$ grain, Powdered Acacia Gum $\frac{1}{4}$ grain, Powdered Tragacanth $\frac{1}{4}$ grain, Powdered Liquorice Root 1 grain, Syrup *q.s.* Varnish. Use similar to the last mentioned.

Chlorbutol. *Syn.* **Chloretone; Acetone-Chloroform, P. Ital. V., F. E. VIII., P. Belg. IV. Trichlor-Tertiary-Butyl-Alcohol.**

$CCl_3.(CH_3)_2C.OH = 177·4256$.

Dose.—5 to 24 grains (**0·3 to 1·5 Gm.**) in cachet, capsule, or tablet followed by a draught of water or milk, or suspended in a mixture.

Manufacture.—This compound was discovered by Willgerodt in 1886, see Bev. 20 (1887), 2455. It is prepared by adding Potash to a mixture of Chloroform and Acetone, and fractionally distilling.

White crystals, with camphoraceous taste, melting at 80° C. It volatilises with heat. ***Soluble*** 1 in 200 of water (solutions should be made as required. This solubility was confirmed by Gordon Perrins.—P.J. i./32,265). It is *correct.*—W. H.M., July, '32. 1 in 10 Glycerin, 3 in 2 Alcohol 90%, 1 in 50 Liquid Paraffin, 1 in 12 Olive Oil.

Uses.—Local anæsthetic and antiseptic and slightly hypnotic. Acts particularly on the stomach. *Solutions* in Liquid Paraffin 1 to 2% have been used for inflammation of the middle ear.

Vaginal pruritus has been treated with a warm douche 0·4%.

For piles, 5 grains in a 30 grain suppository; for a dusting powder for wounds and scalds use Chloretone 23, with Zinc Oxide 120, and French Chalk 90 parts. 10% may be added to Linimentum Calcis for burns.

Chloretone Inhalant.—Contains Chloretone 1%, Camphor, Menthol and Oil of Cinnamon in Liquid Paraffin for use in rhinitis, bronchitis, nasal catarrh and 'sore throats.'

Solutio Chloretonæ Composita Inhalans. *Syn.* SOLUCIÓN DE CLORETONA COMPUESTA INHALANTE, F.E. VIII.

Chloretone 1 ¡Gm., Camphor 2·5 Gm., Menthol 2·5 Gm., Cinnamon Oil 0·5 Gm., Liquid Paraffin 93·5 Gm.

Capsules, 5 grains, check sea-sickness and other vomiting and are useful in chorea.

POST-OPERATIVE VOMITING and shock prevented. Value proved by 15 grains in a cachet where time permitted, to every adult operated on 1½ hours beforehand.

TETANUS successfully treated by Chloretone in dose varying between 30 and 120 grains per rectum in Olive Oil, and Antitetanic Serum. The Chloretone injections reduced rigidity of the jaw.—B.M.J. ii./10,1402.

SEA-SICKNESS. Should be given either in solution or limited to 10 grains daily with intermissions when extended over several days. Satisfactory when given in Oil or Paraffin or in Cachet when taken with moderation.—L. i./13,1375.

Semi-coma in a woman who took 30 grains for toothache has been observed. A useful drug, but its action requires careful supervision. The explanation of toxic effect is, that there is accumulation of the insoluble drug in the alimentary canal followed by sudden absorption of large quantities when any substance capable of absorbing it is taken by the mouth.—L. i./13,1557.

DYSMENORRHŒA well treated with Chloretone 5 grains two or three times daily for week before period.—B.M.J.E. i./26,13.

NERVOUS VOMITING and vomiting due to pertussis. Effective dose 0·05 Gm. Drowsiness which may develop after 8 or 10 days' medication counteracted by adding 0·015 Gm. Caffeine.—P. Freud, Jl. A.M.A. ii./29,1181.

Sea-sickness, whooping-cough, conjunctivitis, and hay fever. In the latter, inhaled as a spray from an atomiser, the solution immediately allays symptoms, the effect lasting many hours. Occasional repetition will carry the patient through distress in early summer. As an anti-spasmodic in acute gastric flatulence, dysmenorrhœa, hiccough, or the pain of shingles.—W. E. Wynter, L. ii./29,1245.

✱**Mothersill's Remedy** (T.M. 368055) and ✱**Zotos** (T.M. 304157) contain it—*cf.* Proprietary Remedies, Vol. II.

Poisoning by Mothersill's Remedy : also stated to contain Scopolamine !—B.M.J. i./30,739. (We doubt it.)

CAFFEINA.

Caffeine (*B.P.*'14). P.G. VI., PH. NED. V., FR. Cx., P. Jap., P. Ital., F.E. VIII., P. Belg. IV. *Syn.* THEINE. GUARANINE.

$C_8H_{10}N_4O_2,H_2O=212·1256$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more—as much as 18 grains being recommended—given in solution, or in pills.

A crystalline alkaloid (M. pt. about 235 to 237° C.), usually obtained from the dried leaves of *Camellia Thea,* or dried coffee-seeds—*Coffea arabica*; also contained in Guarana (*q.v.*) and in Maté—the leaves of *Ilex paraguayensis*—also kola nuts—the seeds of *Cola acuminata,* growing in Western Africa; it is identical with Theine and Guaranine. Caffeine and Theobromine (*q.v.*) can be prepared from Xanthine $\left\{\begin{matrix}NH.CH:C.NH\\CO.NH.C:N\end{matrix}\right\}CO$ (Theobromine being di- and Caffeine tri-methyl-xanthine). These are Purin derivatives (*q.v. Vol. II.*). ***Soluble,*** 1 in 80 of water, about 1 in 40 in alcohol, less in Ether; acids render it more soluble in water, but it is a feeble base, and on concentrating the solution of the salts they are apt to split up, and the caffeine crystallises out by itself. Is rendered soluble in less water by the addition of an equal quantity of Phenazone. See also Caffeine-Sodio-Salicylate, *etc.*

Regarding th caffein in coffee and tea taken as a beverage, see Vol. II.

Antidotes.—Stomach-pump and emetics, *e.g.* Apomorphine $\frac{1}{12}$ grain. Nitroglycerin is also of value. Poisoning by 60 grains of citrate caused burning in throat, giddiness, violent vomiting, purging and diuresis, tremors of extremities, pain in stomach and bowels, and great thirst.

Uses.—In heart affections (*e.g.*, cardiac failure in pneumonia), but its power as a cardiac stimulant is doubted, nervous headache, dropsy (of value in renal dropsy), stomachic (lessens metabolism). It wards off fatigue. Also given in diarrhœa. Subcutaneously in rheumatic affections with Sodium Salicylate, *q.v.* Locally, to the eye, it dilates the pupil.

Bronchial asthma of adults is relieved by 2 to 5 grain doses of the Citrate before bedtime and again during the night.—Yeo.

Neuralgic Powders. Caffeine 1 grain, Quinine Hydrochloride 5 grains, Phenazone 10 grains (or Phenacetin 5 grains).

CHLOROSIS.—Caffeine in conjunction with Digitalis should be used. Magnesium Sulphate is useful for the bowels, and Zinc Sulphate has been tried by mesis. Intake of liquids must be limited, and as little salt must be taken s possible.—B.M.J. ii./09,1668.

For Estimation of Caffeine in presence of Acetanilide, see Vol. II.

Elixir Caffeinæ—*Martindale.*

Dose.—1 to 2 drachms (=1 to 2 grains of Caffeine). Caffeine 17·5, Diluted Hydrobromic Acid 4, Simple Elixir (B.P.C. 1894) to 1,000.

℗ **Elixir Antineuralgicum.** (*Not* within D.D.A.).

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Phenazone 50, Caffeine 30, Cocaine Hydrochloride 1, Cochineal Tincture 6, Elixir of Orange 25, Alcohol (75%) to 1,100. Has been used on the Continent for headache.—Ph. Notes.

affeinæ Citras. $C_8H_{10}N_4O_2.C_3H_4(OH)(COOH)_3=376·1724$.

CAFFEINA CITRATA (*B.P.* '14), U.S. (No formula; 48—52% Anhydrous Caffeine.) F.E. VIII. (50% approx.).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

Combine Caffeine 1 and Citric Acid 1 in a small quantity of distilled water and evaporate to dryness on a water bath.

Soluble—1 in 32 Water, 1 in 25 Alcohol (90%).

Incompatible with Potassium Iodide and Spiritus Ætheris Nitrosi, Iodine being liberated. But the following according to our experiments does not darken :—Potassium Iodide 5 grains, Caffeine base $2\frac{1}{2}$ grains, Spiritus Ætheris Nitrosi (neutralised with Ammonium carbonate) 30 minims, Water to 1 ounce.

Also incompatible with Sodium Salicylate. A little Sal Volatile or Sodium Hydroxide will prevent the Salicylic Acid being thrown out —or use half the Citrate as Caffeine Base.

Flavoring—Glyl or Syl Vanillæ, Glyl or Syl Lavandulæ; Syrupus Aurantii Floris.

Uses.—See Caffeine.

affeinæ Citras Effervescens. (*B.P.*'14). Contains 4% of the Citrate, or about $2\frac{1}{2}$ grains in a drachm, as in *B.P.*'98.

Dose.—**1** to 2 drachms.

Effervescent Caffeine Citrate with Potassium Bromide, has in addition 5 grains of the latter salt to the drachm. For headache.

Tabellæ Caffeinæ Citratis, containing 1 grain in chocolate basis, are agreeable to the taste. **Tablets,** contain 2 grains (**0·12 Gm.**).

Tablets of **Caffeine** 1 grain (**0·06 Gm.**), with **Phenazone** 3 grains also prepared with **Phenacetin** 4 grains. *Dose.*—1 to 5.

Caffeine Hydrobromide, $C_8H_{10}N_4O_2$, HBr, $2H_2O$ = 311·065. ***Soluble*** 1 in 50 approx., the **Hydrochloride** $C_8H_{10}N_4O_2$, HCl $2H_2O$=266·614 and the **Hydriodide** (unstable) are in use.

Dose of each.—½ to 5 grains (**0·03 to 0·3 Gm.**) or more. In transparent crystals.

Tablets contain 2 grains each of the Hydrobromide.

Effervescent Caffeine Hydrobromide is prepared containing 4%, or about 2½ grains in a drachm.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Caffeinæ Salicylas. $C_8H_{10}N_4O_2.C_6H_4OH.COOH$=332·1568.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in water.

Caffeine is very soluble in aqueous solutions of Benzoate, Cinnamate, and Salicylate of Sodium. These dissolve it in chemically equivalent quantities.

Caffeinæ Sodio-Salicylas.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) hypodermically, or *per os.* Max. single dose *per os,* 1 Gm. or in 24 hours, 3 Gm.

Evaporate to dryness Caffeine 50, Sodium Salicylate 60, Water 200. A white amorphous powder, containing 43·8% of Caffeine, and soluble 1 in 2 of water.

This salt and the corresponding cinnamate and benzoate act like Digitalis, but more rapidly.

Caffeinæ Sodio-Benzoas. P. Jap. IV., P.G. VI., U.S. X., P. Belg. IV., P. Ital. V.

Dose.—As for the Sodio-Salicylate. Contains approx. 40% Caffeine. Ph. Ned. V. require 50%. P. Ital. V. must yield 43 to 46% Anhydrous Caffeine.

Soluble 1 in 2 of water, 1 in 40 of Alcohol 90%.

As stimulant for desperately ill patients 2 grain doses, *intravenously.* It improves breathing, circulation and other fundamental functions, and, following its use, the mind and depressed vital reflexes become active and normal. Coma, shock, collapse under anæsthesia, and poisoning from Morphine and other depressant drugs treated. W. W. Duke, J.A.M.A., April 7th, 1923,998; see also P.J. i./23,403.

Sterules, Intravenous, of Caffeine Sodio-Benzoate.

2 grains (**0·12 Gm.**) in 15 minims (**1 Cc.**) and in 75 minims (**5 Cc.**) are prepared.

HÆMOGLOBINURIC FEVER well treated with Caffeine Sodio-benzoate intramuscularly, 3 grains twice daily for 7 days and once daily for further 5 days.—**A.** A. Facio and M. D. Rojas, Jl. Trop. Med., Feb. 16, '25,88.

SHOCK.—For use in the event of severe Novocain reaction. Caffeine 3 grains Sodium Benzoate 7 grains, Strychnine $\frac{1}{40}$ grain.—C. Hope Carlton, B.M.J. i./25,651.

Injectio Caffeinæ Hypodermica. K. C. H.

Caffeine 20 grains, Sodium Salicylate 17½ grains, Distilled Water to 1 drachm. *Dose.*—1 to 6 minims, contains 1 grain in 3 minims.

Unirritating—recommended for alcoholic and morphine intoxication, also for hemicrania and in rheumatism.

The addition of Camphor as preservative for this injection is suggested. Thus to 3 Cc. of pure sterile glycerin add a solution of Caffeine and Sodium Salicylate of each 0·25 Gm. in water 1 Cc.; then add Spirit of Camphor (10%) 1 Cc.; 5 Cc. contain Caffeine 0·25 Gm. and Camphor 0·1 Gm.

Hypodermic Tablets contain Caffeine Sodio-Salicylate ½ grain (**0·03 Gm.**). **Sterules** Hypodermic 1 grain (**0·06 Gm.**) and 2 grains (**0·12 Gm.**).

Iritis of rheumatic origin has been treated by injection into the median cephalic vein of Caffeine 0·05 Gm. with Sodium Salicylate 0·5 Gm.

Caffeinæ Tri-iodidum, Caffeine Di-iodo-hydriodide.

(*Sometimes called Caffeine Periodide—but it is not a 'true' periodide.*)

$C_8H_{10}N_4O_2HI$, $I_2+1\frac{1}{2}H_2O=602·9352$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

In prismatic black iridescent crystals, rich in iodine.

Has been used with success in rheumatism and gout.

Assay.—The two loosely combined Iodine atoms can be estimated by titration with standard thiosulphate solution and should equal about 43%. The total Iodine is 63% approx.

ℙ **Pilula Caffeinæ Tri-Iodidi Composita** (*Billimoria*).

Dose.—One early in the morning, one about 3 or 4 p.m., and one at bedtime with water, to be lessened to two or one a day as required.

Caffeine Tri-iodide 2 grains, Arsamin ¼ to 1/3 grain, Valerianic Acid 2 minims, Green Extract of Belladonna 1/6 to 1/3 grain, Jalap Extract, *q.s.* (if constipated), Reduced Iron 1 grain (in asthma only). For one pill or preferably Gelatin Capsule.

Asthma in India has been well treated with this compound.

R. B. Billimoria (Bombay) states the majority of the cases there have not the usual book type 'attacks,' but dyspnœa every night for days and days, while during the day the patient may be fairly comfortable or again the dyspnœa may be slight or worse.

Whooping cough even in infants, with proportionately smaller doses, has likewise been well treated by this preparation.

✱**Eupnine Vernade** (T.M. 452489). *Dose.*—1 drachm before meals up to 4 drachms daily. Contains Caffeine and Iodine. In asthma, emphysema, and arteriosclerosis.

In asthma it is useful, also Morphine ¼ grain, especially if it induces sickness.—J. Pirie, B.M.J. ii./25,1039.

Caffeinæ Valerianas. $C_8H_{10}N_4O_2.C_5H_{10}O_2=296·188$.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**). In irregular crystals or powder, of somewhat variable constitution. It controls hysterical symptoms, and is useful in pertussis.

Ⓟ **Caffeine-Chloral.**

Small white granular crystals, freely soluble in water, with the taste of Chloral. Is analgesic and laxative, and in hypodermic injections of 3 to 8 grains useful in constipation, painful gastric distension, sciatica, and rheumatism.

Iodo-Caffeine.—*Syn.* SODIUM-CAFFEINE IODIDE.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

A white powder, slightly soluble in cold, freely in water at 100° F. Contains 65% of Caffeine. Is a good diuretic, especially to prolong the diastole in cases of enfeebled heart. Is useful in cardiac dropsy, and pleurisy with effusion. Said not to disorder digestion.

Antipyrin Caffeino-citricum.—*Syn.* ✱MIGRAININE (T.M. 73257), **P. Austr., P. Jap. IV., P. Helv., and Ph. Ned. V.**

Dose.—8 to 15 grains (**0·5 to 1 Gm.**). Slipule No. 00 holds 8 grains.

Contains 9% of Caffeine, 1% Citric Acid, and 90% of Phenazone, is of crystalline appearance, easily soluble in water.

Incompatibles as Phenazone *q.v.* Is serviceable in headache, but apt to cause sleeplessness.

Migralgin.—*Martindale.* *Dose.*—8 to 15 grains (**0·5 to 1 Gm.**).

Phenazone 88, Caffeine 9, Salicylic Acid 3: the ingredients are fused together. **Tablets** 8 and 15 grains each. Slipule No. 00 holds 8 grains.

Headache is well treated with this combination.

Oxyquinotheine Cachets—Dr. Faivre's.

According to analysis by C. Mannich and L. Schewedes in a German Journal these are said each to contain Caffeine 0·3 Gm., Pyramidon 0·15 Gm., Quinine Sulphate 0·135 Gm., Magnesia 0·04 Gm.—Copied from P.J. i./13,891.

Kola.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**). Seeds of *Cola vera* contain about 2½% Caffeine, also in *C. acuminata* (not so much) (*Sterculiaceæ*).

FR. CX. Supp. 1920 allows seeds of other varieties of Cola providing they contain at least 1·25% Caffeine. (Not mentioned in FR. CX. Nouv. Supp. 1926.)

Extractum Kolæ Liquidum. B.P.C. *Dose.*—10 to 20 minims. Kola nuts in 40 powder exhausted with 60% Alcohol; 1=1.

FR. CX. standardises to 1·25% Caffeine, but the method of manufacture is stated to be impracticable.

The administration of Kola, Coca and Arsenic flavoured with a little Elixir of Orange forms a useful tonic and pick-me-up.

Flavoring.—Syl Lavandulæ; Syrupus Aurantii.

Tinctura Kolæ.

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Kola nuts in powder 1, macerate one week in 60% Alcohol *q.s.* to 6.

Vinum Kolæ.

Kola in coarse powder 1, in Sherry 25, macerate for 7 days, filter and flavour with Essence of Vanilla.

Celerina is said to contain Kola, Coca, Celery and Viburnum.

Ⓟ **Syrupus Kolæ Compositus.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**) twice daily.

Iron, Quinine and Strychnine Citrate 3, Citric Acid 0·3, Sodium Glycerophosphate 5, Liquid Extract of Kola 50, Alcohol 90% 5, Syrup of Orange to 100. Finished product to be slightly acid. In anorexia, and as a general 'tonic.'—Ph. Notes.

Maté, *Ilex paraguayensis* (*Ilicaceæ*) *Syn.* Yerba, Paraguay tea, Hervea, or Jesuit tea, contains less caffeine than tea, and is less astringent. Removes fatigue and induces sleep.

About the '*herva matte*' drinking, there is a complete system of etiquette. Narcotic in influence, it has none of the after effects of tea. It is tonic, laxative, febrifuge, and stimulant to the digestive organs.—P.J. ii./22,387.

For further notes on Maté—Analytical, Dietetic and Commercial, see Vol. II.

CALCIUM.

Ca=40·08.

Calcii Carbonas. (*B.P.*'14.) $CaCO_3$=100·08. *Syn.* Craie Preparée. Gefälltes Calcium Carbonat.

Dose.—Per os 15 to 60 grains (**1 to 4 Gm.**).

White insoluble powder. Much employed in diarrhœa and dysentery and as an ingredient in tooth powders.

Sys Specific. An Indian cure for sprue, dysentery, and diarrhœa. It consists of 'powders' containing principally Calcium Carbonate —one to be mixed with 12 ounces of water and laudanum to be added, if necessary.

Diarrhœa of gastric origin is well treated by Calcium Carbonate and Calcium Phosphate equal parts, a teaspoonful thrice daily.

The best antacid without any other inorganic salt in the gastric hyperacidity syndrome and in gastric and duodenal ulcer.—Jl. A.M.A. i./27,1558.

Mistura Cretæ, Chalk Mixture (*B.P.*'14).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Contains 3% with Sugar 6% and a little Tragacanth, in Cinnamon Water. The powders are generally kept mixed in a dry condition, and added to the Cinnamon Water as required.

Blair's Tooth Powder. Dissolve 3 of soap in about 4 of water and mix intimately with about 25 of precipitated chalk and dry at moderate heat. Dissolve Catechu 1 in Alcohol 5 and mix intimately with precipitated chalk 25. Mix equal parts of Oil of Wintergreen and Oil of Sassafras with a further 25 of precipitated chalk, using 6 drops of mixed oils for each 100 Gm. of powder. Mix the three portions and sift.—P.J. i./22,263.

Calcii Chloridum. (*B.P.* '14). F.E. VIII. $CaCl_2$=110·994.

(**Calcium Chloride Crystal** ($+6H_2O$), as in P. Jap. IV., P. Belg IV. and P. Ital. V., is occasionally ordered. It contains only 50% Calcium Chloride. U.S. X. requires not less than 75% Calcium Chloride. P. Ital. V. also mentions the fused of commerce, containing 20 to 25% H_2O ($CaCl_2.2H_2O$).)

Dose of the Anhydrous Salt.—Per os 5 to 15 grains (**0·3 to 1 Gm.**) in aqueous solution, or pills made with syrup; these must be kept in bottles.

Intramuscularly (deeply) 1 grain (**0·06 Gm.**) in 15 minims (**1 Cc.**) or 75 minims (**5 Cc.**) Hypodermically it may produce sloughing. *Intravenously* 4 grains (**0·25 Gm.**) in 75 minims (**5 Cc.**) have been given.

Intravenous injection of 4 Cc. of a 10% solution dangerous—believed to cause heart-block.—W. D. M. Lloyd, B.M.J. i./28,664.

In fused white agglutinated, very deliquescent masses.

Soluble (the fused salt) in water 1 in 1½, in alcohol 90% 1 in 3.

Incompatible with carbonates, phosphates, sulphates and tartrates.

Flavoring.—Prescribe as Elixir *q.v.* or with Elixir Saccharini.

Calcium Chloride Sterules are prepared 5%, 5 Cc., and 10%, 5 Cc.

Uses.—Calcium Chloride increases the coagulability of the blood, and so acts as a hæmostatic (Sir A. E. Wright). Coagulability of the blood is—

Increased by—	Diminished by—
Carbonic Acid,	Oxygen,
Calcium Chloride or Lactate,	Alcohol,
Milk,	Restriction of food,
Magnesium Carbonate or Lactate,	Diminution of Lime Salts,
Phosphoric Acid and Soluble Phosphates,	Large quantities of fluid,
Strontium Carbonate or Lactate,	Citric Acid,
Thymus Gland.	Rhubarb,
	Acid Fruit Juices,
	Acid Wines,
	Tobacco smoking,
	Bile,
	Leech Extract, Hirudin (*q.v.*).

It is employed in itching skin affections, *e.g.*, pruritus, prurigo, urticaria. It is useful in chilblains, full dose frequently, and certain forms of headache, *v. infra.* In tubercular disease, chorea, glandular affections, to stop the growth of uterine fibroids, and to check the vomiting due to sarcinæ.

Administration and Removal of Lime Salts.

According to Sir James Barr fixed *lime* (in the albumin molecule) increases viscosity and coagulability, while the *free* Calcium ions in association with the suprarenal and pituitary secretions increase the tone and contraction of the arteries and arterioles, heighten blood pressure and maintain force and efficiency of the cardiac contractions. Some persons absorb lime more quickly than others—a glass of milk may increase lime in the urine in an hour or two. The blood is the agent for carrying the lime to the tissues and from them to the excretory organs. Lime Salts have been found useful in treating exophthalmic goitre. The following are some special lines of treatment.

Angina Pectoris.—Phosphoric Acid ½ drachm (of the dilute acid) every four hours and all lime to be excluded from diet and the drinking water. On the other hand, there may be deficiency of lime, in which case Calcium Iodide and Iodine Tincture is beneficial.

Arteriosclerosis.—Chronic high tension leads to degenerative changes with subsequent atheroma and calcification of the deep layers of the intima of the aorta—lime salts are deposited as Calcium Soaps. Women are not so liable to arteriosclerosis as men—they get rid of a good deal of Calcium with each menstrual period.

Asthma.—There is an excess of free Calcium ions in the blood. Decalcifying agents to be given and lime-free diet. Milk, etc., rigidly excluded.

Bronchitis and Emphysema.—There is not, as a rule, too much free lime, but in the later stages too much fixed lime—rigid costal cartilages and fixed chest wall. Never let these become rigid—use decalcifying agents and lessen intake of lime.

Cirrhosis.—Lime index generally low, owing to the catarrh of the stomach and the intestines set up by the alcohol. First stop the alcohol.

Colitis.—In some cases of obstinate constipation there is too much lime in the blood and intestinal wall. In mucous colitis all forms of lime should be forbidden. Fats of the unsaturated type, *cf.* note under Oleum Morrhuæ, *e.g.*, a wineglassful of Olive Oil at bed-time, should be ordered.

Digestive Tract.—So-called ' congenital ' hypertrophic stenosis may be due to excess of lime in the milk. If people kept their bowels open, thus preventing

B. *Coli* from assuming a malignant type, appendicitis would be rare. Some people absorb Calcium badly—this is due to the form in which it reaches the mucous membrane. The insoluble fats, Stearin and Palmitin, which constitute the greater part of beef and mutton fat, can be extracted from the fæces to the extent of 80% or more. The acids of these fats when split off readily combine with Calcium forming insoluble soaps which irritate the mucous membrane. Cod Liver and Olive Oil, butter and bacon fat contain a large amount of unsaturated fatty acids, which, *even* with lime, form relatively soluble soaps. When, therefore, a person is for any reason on a + lime diet the fat should consist largely of Olein. This may partly account for beneficial action of Cod Liver Oil in rickets.

The popular view that ***milk*** is a suitable diet ***in adults*** in any form of ***illness*** is ***erroneous.*** In the production of intestinal stasis the lime salts play an important part. Insoluble Calcium Soaps have an injurious, irritating effect on the intestinal mucosa. On the other hand in atony of the stomach and intestines there is deficiency. Where lime is necessary it may be given internally as Iodide or Glycerophosphate or subcutaneously largely diluted with Normal Saline with addition of 5% Glucose.—B.M.J. ii./12,695.

The commonest cause of gastric catarrh and of cirrhosis of the liver is alcohol; while the teetotaller, from eating too much and from immoderate consumption of lime salts, more frequently suffers from arteriosclerosis and chronic diseases of the kidneys.—B.M.J. ii./12,162.

DISSEMINATED SCLEROSIS.—Calcium Salts useful: the Sodium Salts injurious. Acids should be avoided.

EPILEPSY.—All the soluble Calcium Salts do good. Calcium Iodide is the most efficient. Milk foods good. *See also* Calcium Lactate.

LOCOMOTOR ATAXIA.—The Calcium Salts are in excess. Give Acid and Strychnine.

MIGRAINE.—Lime Salts as a rule are in excess. Eliminate same from the diet and give Magnesium Sulphate in the mornings.

MUSCULAR SYSTEM.—In myalgia, or the so-called muscular rheumatism, there is Calcium deficiency. Correct also any dilatation or acid fermentation.

NEURASTHENIA AND HYSTERIA.—Lime Salts variable. As a rule they are deficient—give Calcium Glycerophosphate.

PNEUMONIA.—'In the acute stage of pneumonia the more scanty and the more sticky the expectoration, the more viscous the blood, the more Lime Salts and leucocytes it contains, *caeteris paribus*, the more favourable the prognosis, and on the other hand the more fluid and hæmorrhagic the expectoration, the more liquid the blood, and the less the Lime Salts and leucocytes, the worse the prognosis.'

RHEUMATISM, ACUTE.—There is an excess of free Calcium ions and a tendency to fibrin formation. Milk diet does harm—plenty of red meat which increases the Ammonia in the tissues and thus neutralises the sarcolactic acid, is beneficial. In gout there is more frequently an excess of lime in the tissues and urine than in the free state in the blood—decalcify, *e.g.*, with Phosphoric Acid.

SKIN—ECZEMA, ETC.—In many cases there may be deficiency of lime and a dilated stomach. In urticaria, eczema and serum rashes there is deficiency of lime in the blood.

TETANY AND CRAMP.—Usually there is dilatation, acid fermentation and deficiency of Calcium Salts.

URINARY TRACT.—Healthy kidneys always excrete a certain proportion of Calcium, though not so much as the bowel. When diseased, Calcium may be retained. It is useful to precipitate the lime when examining urine as a routine. If there be no excess in the blood there will be none in the urine, but the condition of the kidneys and the Sp. Gr. of the urine must be taken into account. In dropsy, Sodium Chloride should be excluded while lime salts are beneficial.

In Dupuytren's contraction surgeons' operations have all failed. There is an excess of Calcium in these cases.—Sir James Barr, B.M.J. ii./10,829.

General References to 'Lime' Therapy.

ACNE.—A 10% solution of Calcium Chloride intravenously, 5 Cc. every third day, increased to 10 Cc. every second day, of value. Inject slowly, taking care not to infiltrate the skin or the hypoderm. When patient complains of heat in the face, stop till this disappears.—Per Pres., Oct., '29,332.

ANEURISM OF THE AORTA (abdominal) apparently cured by Calcium Chloride in doses of 15—30 grains.—Whitla, Pract. Med.

ANGIO-NEUROTIC ŒDEMA treated with 10 grain doses thrice daily, increasing to 20 grains. The swellings which appeared continuously in different parts of the body disappeared completely.

ARTERIAL ATHEROMA, DECALCIFIED DIETARY.—The amount of 'lime' necessary to man decreases with age. An adult should not take more than 1 Gm. a day—he eliminates about 0·9 Gm. *pro die*—elimination ought to be proportional to intake. Cows' milk, cheese, eggs, onions, contain 0·2%, being rich in lime. Moderately rich (0·1 to 0·2%) are peas, beans, cauliflower; poor in lime (less than 0·1%) are bread, meat, fish (most kinds), potatoes, apples, pears, plums, etc. Large amounts of milk, bread, beef tea, and green vegetables must not be taken by atheromatous subjects.

Blood Calcium.—*See* METABOLISM *postea.*

BRONCHITIS.—The popular belief that hot lemonade 'cuts the phlegm' may be due to the fact that citric acid in lowering the coagulability of the blood would thus give it greater ease of gaining access to the infected focus.

CHILBLAINS.—Calcium consumption helps to an extent.—B.M.J. i./31,516.
Coagulation-time of blood *not* delayed in chilblains.—R. Hallam, B.M.J. i./31,215.

CHOREA.—There is a rather low total serum Calcium content. The Calcium content of the cerebro-spinal fluid is consistently low.—E. C. Warner, L. i./30,339.

ECLAMPSIA.—Calcium Therapy is *the* prophylactic.
Continuous administration during pregnancy of 15 grains Calcium Phosphate in ½ ounce water thrice daily as prophylactic in midwifery, combined with a 1 in 1,000 solution of Acriflavine in Glycerin (*q.v.*) for vaginal injection.—J. L. Moir, B.M.J. i./31,118.
Eclampsia treated by washing out the stomach and transfusion of a pint of Calcium Chloride Solution (30 grains to the pint) into a vein of the arm—also 20 grain doses four times daily *per os*. Rapid improvement. Possibly the Calcium Chloride acts as sedative to nerve cells.—B.M.J. ii./12,1124.
Calcium Therapy in eclampsia disappointing. The fits are not influenced by the Calcium content of the serum.—W. C. W. Nixon, L. ii./31,292.

ECZEMA treated with a 6% Calcium Chloride ointment: found to be effective.—G. Lampronti, per P.J. i./23,573.

EPIDIDYMITIS well treated by intravenous injection of 0·5 to 1 Gm. in dilute solution—4 or 5 injections once daily.—Per Jl. A.M.A. ii./28,1136.

EPISTAXIS has been treated by 10 grains, *t.d.*

GLYCOSURIA.—The greater the amount of sugar the larger the excretion of Calcium. It can be reduced by giving Sodium Bicarbonate.—F. Ransom.

HÆMATEMESIS OF GASTRIC ULCER.—In severe cases the only reliable drug is Calcium Chloride, 1 drachm dissolved in 5 or 6 ounces of water given by the rectum, alone or in conjunction with saline transfusion or subcutaneous injections.—Whitla, Pract. Med.

HÆMOPHILIA treated intravenously, 10—12 injections of 20 Cc. of 5% solution.—Paris Med., Dec. 6/24,467, per Pres., Jan., '26,23.

Coagulation of the blood is thought to be little affected by Calcium Chloride *per os*, but ***injected*** the time of coagulation was reduced in 15 minutes from 3½ minutes before injection to 1¾ minutes after.—Dixon, B.M.J. ii./09,540.

As ***hæmostatic.*** Calcium Chloride should be given ***intramuscularly.*** Hypodermically it may produce sloughing even in 1 grain doses.—W. R. Grove, B.M.J. i./20,47.

HÆMORRHAGE controlled by intramuscular injection of Calcium Chloride. 1 grain in 100 minims injected *deeply* into the gluteal muscles is generally painless. The Calcium value of the blood is found to rise slowly to a maximum in 6 hours and then to remain constant for 24 hours. The effect is probably a direct one on the blood vessels. The increased Calcium content of the plasma may cause combination between the Calcium and the blood lipoids with consequent acceleration of clotting. A second injection at end of 24 hours and a third, 24 hours later, may be given. *Per os, Calcium salts have no effect on blood Calcium.* Helpful in uterine hæmorrhages and results in aneurisms hopeful.—W. R. Grove and H. W. C. Vines, B.M.J. ii./21,40.

HÆMORRHAGES, INTESTINAL, to check, 30 to 60 grains daily have been given internally, accompanied by rectal injections containing 60 grains to two pints of water; opium may be given in addition.

HAY FEVER.—Consumption of large quantities of flesh increases the excretion of Calcium. A low body content of Calcium is favourable to hay fever, the administration of Calcium Chloride acting beneficially. A retention of Potassium and a greater output of Sodium results from increased Calcium in the diet.—J.C.S.A. i./22,1210. 10 grain doses *t.d.* have been advised.

HEART FAILURE accompanying post-influenzal pneumonia, Sir Lauder Brunton pointed out, may be averted by extended use of Calcium Chloride. Usual dosage is 5 to 10 grains every four hours. Increases secretion and tones up the vessels. May be prescribed as ELIXIR *q.v.*

For INTER-DENTAL FISSURE 15% solution on pledget of wool.

JAUNDICE. 5 Cc. of 10% solution intravenously helped to hasten coagulation of the blood, prevent post-operative bleeding, and neutralise toxic bile products.—Jl. A.M.A. ii./25,885.

MENSTRUATION, PROFUSE, to check. Doses of 10 to 15 grains daily for a week before the period, have been given; but not if there be kidney disease, but see ref. under Nephritis, etc., *infra.*

An excess of Calcium Salts in the blood thought to be associated with the menstrual period.

Metabolism.—Daily Calcium requirement of growing boys found to be 0·43 Gm. When an individual is living on a low Calcium diet the amount of Calcium in the blood may not necessarily reflect the deficiency.—J. M. Henderson, L. ii./30,755.

Importance of Calcium metabolism.—G. Arbour Stephens, B.M.J. i./31,605.

Studies in Calcium and Phosphorus metabolism.—Donald Hunter, L. i./30, 897,947,999,1022.

The free or floating Calcium added by means of milk to a nursing mother's diet is of intense value, both to mother and child. In addition, as Calcium Phosphate has to be formed, the Phosphorus-Calcium ratio must be correct. The Calcium of the diet should be 0·63 (minimum total Calcium per diem 0·9 to 1 Gm., and of Phosphorus 0·88). In treatment of tuberculosis Calcium to be given to promote calcification.—F. E. Tylecote, M.P., Mar. 27, '29,261.

Significance of blood Calcium. About 60% of the Calcium in the blood is in a diffusible form, the rest is probably combined with protein. When food ingested is free of Calcium, tetany occurs. Hypocalcæmia occurs in spasmophilia, rickets, renal dwarfism, cœliac disease, osteomalacia, parathyroidectomy, and renal disease.—Dan T. Davies, L. i./30,149.

NEPHRITIS and ŒDEMA successfully treated with Calcium Chloride, 2½ to 3½ drachms daily, free diuresis occurring.—B.M.J.E. ii./24,62.

In chronic parenchymatous nephritis the Calcium is at a low level.—Dan T. Davies, L. i./30,203.

On the NERVOUS SYSTEM Calcium has a sedative effect and diminishes permeability of the walls of the blood vessels.—B.M.J. ii./10,1594.

PILES, BLEEDING, have been treated by injection every morning of 4 to 6 drachms of a 10% solution.

PLEURITIC EFFUSION. Calcium Chloride *per os* found to have remarkable effect in treatment. 30 Gm. of the dry granulated salt (*Caution*: an extraordinary dose!) in 100 Cc. of water taken in a little coffee and milk the best method of administration.—Per Pr., Sept., '23,233.

PNEUMONIA, ACUTE LOBAR, has been treated with 5 to 15 grain dose every 3 hours.

SCURVY.—In the siege of Kut-el-Mara, Calcium Chloride was urgently needed by the Mesopotamia forces for treatment of scurvy. It was "home-made" by acting on lime with Hydrochloric Acid, of which latter there was abundance (used with Potassium Chlorate for chlorinating water). Nearly 2 lbs. of this home-made Calcium Chloride was issued daily for 2½ months.—I.D. i./17,576.

In SKIN DISORDERS, clinically, the effect though good, is not due to increased coagulability of the blood. The soluble salts have no particular value. Mistura cretæ as useful as Calcium Lactate.—Prof. R. B. Wild.

SPASMOPHILIA (INFANTILE TETANY) well treated by 30 grains *per os* every 3 hours; rapid cessation of convulsions. Cod Liver Oil as well and after.—Graham and G. H. Anderson, B.M.J. i./24,903.

In acute cases the Calcium content of the serum ranges between 4 and 8 mgr. per 100 Cc. Give Calcium Chloride 2 Gm. every 2 hours. As much as 6 Gm. can be given in 24 hours to an infant without any apparent intolerance in milk. Improvement in ½ hour. Hydrochloric Acid (*e.g.*, 260 Cc. of N/10 Acid with 750 Cc. Milk) and Ammonium Chloride, 5 Gm. a day, also efficacious, but they are only transient in effect.—Dan T. Davies, L. i./30,202.

THROMBOSIS OR EMBOLISM, tendency to, should be stopped by decalcifying agents such as Phosphoric and Citric Acids and their soluble salts.—Sir James Barr.

TUBERCULOSIS (Intestinal—producing tuberculous diarrhœa) has been treated by Calcium Chloride ***intravenously,*** *e.g.*, 5 Cc. doses of 5% solution with benefit. Ascribed to the action on the sympathetic system, checking peristalsis.—Pres., Nov., '19, p. 202. *The tolerance of the patient should invariably be ascertained before administering the full dose.*

Tuberculous intestinal ulcers healed by weekly intravenous injections of 5 Cc. of 5% solution for 102 weeks.—Am. Rev. Tub., Sept., '25, per Jl. A.M.A., ii./25,1583. It has been adopted with heliotherapy and dietetic treatment as a standard treatment for cases showing gastro-intestinal involvement.—Am. Rev. Tub., April, '24.

Intravenously 'surpassed all expectations' in the treatment of 200 cases of pulmonary, surgical, or inflammatory tuberculosis. 1, 1·2, 1·4, or 1·5% solution injected in two series of 15 injections with 10-day interval between series. Controls hæmoptysis and reduces clotting time of blood.—Per Jl. A.M.A. ii./25,1169.

Calcium chloride intravenously is excreted in the urine to the extent of about 50% in 3 hours and is completely excreted in the urine and fæces in 3 days. It is impossible to bring about retention of Calcium in tuberculous patients even by a series of injections at short intervals.—Biochem. Z., '26,/146, per B.C.A., '26,A753.

Intravenous injections should not exceed 1% strength. 50 Cc. doses given slowly.—Jl. Trop. Med., Nov. 2, '25,386.

Workers *in lime and Plaster of Paris, found in general to be immune.* In the treatment of tuberculosis it is needed not only for healing properties but also to overcome hypo-alkalinity or acidosis, which is almost always present. Patients should have plenty of vegetables and fruits, milk and eggs, and if possible shells of fresh raw eggs ground to powder—boiled or stale will not do. —F. Tweddell, Med. Rec. per Medical World, April, 1922.

Weekly intravenous injections of 5 Cc. of a 5% solution of Calcium Chloride, over a period of 102 weeks, healed tuberculous intestinal ulcers.—Jl. Intrav. Therap., '26,15.

URINARY INFECTIONS, particularly colon bacillus pyuria, cured by rendering the urine acid by a daily fractionated dose of Calcium Chloride in 2 litres of water, the treatment being based on the assumption that the pH controls the growth of bacteria. Contraindicated if kidneys are pathologic or if there are signs of diabetes.—Per Jl. A.M.A. ii./25,1768.

VIPER BITES well treated with 3% solution intravenously.—C. Kobayashi, per Jl. Trop. Med., May 1/22,121.

VOMITING OF PREGNANCY, uncontrollable, successfully treated by intravenous injection of concentrated solution, 35% of Calcium Chloride, in 2 Cc. doses.—L. i./24,663.

Calcium in the human economy.—W. R. Grove, Clin. Jl., Oct. 31/23,521.

A seasonal variation, especially in children, of Phosphorus and Calcium content of the blood—percentage being highest from March to July, the months of maximum sunshine, with a fall from August to February. —C. W. Saleeby, P.J. i./23,247.

An interesting discussion on the therapeutic uses of Calcium Salts at the meetings of the B.M.A. 1927.—B.M.J. ii./27,777 *et seq.*

In the **Nauheim Baths** the increased specific gravity has a primary effect of raising the peripheral resistance of the body which is afterwards followed by reaction, and the effervescence stimulates, but the Calcium Chloride in the water has no effect—it is not absorbed—otherwise it might work great mischief.

Transkutan (T.M. 485353).
A proprietary containing Calcium Chloride, Iodine, Bromium, Strontium nd Lithium Salts, and Radium, with aromatic oils, for adding to baths at 8°, increased to 106—108°. Patient lies in the bath for 10 minutes and is nen put to bed with hot packs for 2 hours. Sweating results and pain is lieved. In rheumatoid arthritis, fibrositis, etc.

iquor Calcii Chloridi B.P. 1885, was 1 to 5 of distilled water.
Dose.—15 to 45 minims (**1 to 3 Cc.**).

lixir Calcii Chloridi. *Dose.*—1 to 2 drachms, best given 1 hour after a meal.
Calcium Chloride 60 grains, Orange Syrup and Syrup of Tolu of ach $\frac{1}{2}$ ounce.

listura Calcii Chloridi, N.H.I.
Calcium Chloride 10 grains, Syrup of Ginger $\frac{1}{2}$ drachm, Water to $\frac{1}{2}$ ounce.

elatinum Calcii Chloridi. (*cf.* Gelatinum for further Gelatin Injections).
Dose.—5 to 7 Cc., warmed in a water bath and cooled to a suitable tempera- ure. To arrest hæmorrhage inject into the gluteal region.
This contains Calcium Chloride 5%, with Gelatin 5 to 10%. The addition f Gelatin stated to avoid the necrotic effect of the Salt.—Pr. May, '13,902.
Shock treated with an injection of Calcium Chloride 0·5 Gm., Glucose 1·5 Gm., elatin 0·3 Gm. in 10 Cc. Water. Ampoules kept ready, melt when required, ive as such or dilute with tap water.—J. E. R. McDonagh, P., Aug., 1920.

alcii Iodidum. CaI_2=293·944. *Syn.* **Calcidin.**
Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**). Given in *dilute* aqueous olution. Deliquescent crystalline powder. On exposure to light or ir will give off Iodine; best preserved in amber bottles. It is tated to have been introduced into medicine by G. Arbour Stephens. See B.M.J., July, 1906). Excellent results in foul ulcers and chil- lains.
Eczematous patch on tibia measuring 7 × 3 inches cured by 4 grain oses thrice daily. Diabetic ulcer on foot, also seat of recurrent ammary carcinoma, were treated with it.

Elixir Calcii Iodidi.—*Dose.*—1 drachm (**4 Cc.**). Calcium Iodide grains, Aromatic Elixir 1 drachm. Employed in tuberculosis.

Calcii Peroxidum. *Syn.* Calcii Superoxydum Gorit.
CaO_2=72·08. It may be made + $8H_2O$.
Dose.—3 to 10 grains (**0·2 to 6 Gm.**) daily.
A white crystalline powder slightly soluble in water, evolving xygen. It explodes if mixed with Glycerin or Formalin.
A useful intestinal antiseptic, given in milk, for infants, *e.g.*, in ummer diarrhœa. Recommended in hyperacidity; also in soil ontaminated wounds.
Under the name "**Calox**" it is contained in a dentifrice. Mag- esium Peroxide 5 to 10% added to a prepared or precipitated halk has also been used.

alcii Phosphas (*B.P.* '14). $Ca_3(PO_4)_2$=310·28. (The Salt accord- ing to N.N.R. in U.S.A. contains 85%.) 'Neutral' or 'Tribasic' Calcium Phosphate, Calcium Ortho-Phosphate.
Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**), but larger amounts (1 to Gm.) are given as antacid.

White powder made by interaction of calcium chloride with sodium phosphate and excess of ammonia at a boiling temperature. Insoluble in water; soluble in dilute hydrochloric and nitric acids.

Uses.—To supply lime to growing bones and to assist in general nutrition. It is also given to pregnant women for the same purpose.

'Antacid' Use.—Being insoluble, it neutralises excess acid in the stomach but does not produce systemic alkalisation.—N.N.R. May be somewhat constipating.

Gastric Ulcer.—Bismuth Carbonate is not an alkali: Sodium Bicarbonate gives off Carbon Dioxide and causes distension and in excess stimulates gastric secretion. Best method of avoidance of free acid and mechanical irritation is by giving hourly feeds of 5 ounces of milk, or its equivalent, through a tube, and neutralising acid by giving doses of Atropine 1/200 grain increased to tolerance: Sodium Citrate prevents milk clotting: Manganese Oxide, dose regulated to keep bowels open: and Tribasic Calcium or Magnesium Phosphate (chiefly the former) *effectually prevents acidosis.* Stomach emptied last thing at night.—A. F. Hurst, L. i./30,242.

Calcii Phosphas Mono-acidus. Fr. Cx., Ph. Ned. V., F.E. VIII., P. Belg. IV., P. Ital. V.

Syn. Dibasic Calcium Phosphate, Calcium Mono-hydrogen Phosphate.

$Ca_2H_2(PO_4)_2$, $4H_2O$ or $CaHPO_4$, $2H_2O$=172·139.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). Prepared by decomposing Calcium Chloride with Dibasic Sodium Phosphate.

Colourless crystals with slight acid reaction. Used in making Liquor Calcis Lactophosphatis, *q.v.*

✱**Pepsodent.** (T.M. 518628, 522821, 396079.) A dentrifice with an acid reaction due to Acid Calcium Phosphate.—L. ii./21,395.

Calcii Phosphas Di-acidus. Fr. Cx., F.E. VIII., P. Belg. IV.

Syn. Monobasic Calcium Phosphate, or Acid Calcium Phosphate.

$CaH_4(PO_4)_2$, $2H_2O$=270·1784. *Dose.*—5 to 20 grains.

Deliquescent crystals, insoluble in alcohol.

Mix Calcium Mono-acid Phosphate 154 Gm. with Phosphoric Acid (50%) 200 Gm. to a paste, and leave to stand 1 hour at about 50° C., add water sufficient to make clear and boil ¼ hour. Evaporate to Sp. Gr. 1·40 (taken on the warm liquor) and leave to crystallise.—Fr. Cx. We have employed this Salt for some time past in making **Syrupus Tann-Iodo-phosphoratus** and **Vinum Tann-Iodo-phosphoratum**, *q.v.*

Calcii Saccharas. **Calcium Monosaccharate** $C_{12}H_{22}O_{11}CaO$=398·2446.

Dose.—8 to 30 grains (**0·5 to 2 Gm.**).

In colourless tufts, soluble in water. An antacid for dyspepsia, specially for children; also as an antidote to carbolic acid poisoning in 10 times above doses.

Liquor Calcis Saccharatus. (*B.P.* '14).

Dose.—15 to 60 minims (**1 to 4 Cc.**).

Prepared by interaction of slaked lime and sugar. Contains nearly 2% Calcium Oxide.

Calcii Gluconas. *Syn.* **Calcium Sandoz.** $(C_6H_{11}O_7)_2Ca=430{\cdot}2516$.
Dose.—Per os. A heaped teaspoonful increased to a tablespoonful thrice daily between meals in water. Children, a teaspoonful thrice daily.

Intramuscularly or *intravenously* 5 to 10 Cc. of 10% solution every 2 or 3 days. Children, 2 to 5 Cc.

Tablets, 25 grains are available. Dose, 1 to 2 according to age.

Gluconic Acid $C_5H_6{\cdot}(OH)_5COOH$ is formed by oxidation of Glucose, Cane Sugar, Dextrin and Starch. A syrupy compound soluble in water, insoluble in Alcohol. Dextro-rotatory.

The Calcium salt forms a white crystalline tasteless powder readily soluble in warm liquids. Contains (Anhydrous) 9·3% Calcium.

Uses.—Taken by the mouth, it is well absorbed. Intravenously it is better tolerated than Calcium Chloride. The acid-base factor is eliminated. Intramuscularly it is painless and non-irritant. It is at present the only Calcium salt which can be given into the muscles in adequate dose. It is said to be almost specific in hay fever, and has influence on many respiratory diseases, relaxing bronchial spasm and decreasing the secretion of mucosa of the respiratory tract. Also used in debility, malnutrition, neurasthenia, rheumatic cardiac manifestations, and urticaria.

Pharmacology.—Maximum tolerated dose in dogs intravenously of **Calcium Gluconate** and **Calcium Lactate** 35 to 40 mgr. Calcium ion per kilo, or 1·5 Gm. in 30 Cc. water for an 8 kilo dog. Caused rise of blood pressure and fall in pulse rate (both more persistent with the Gluconate), and Digitalis-like effects. Over-dosage caused Cheyne-Stoke's respiration. Margin between effective and toxic doses not great. Intravascular clotting the greatest danger —*gives no warning and may cause sudden fatality.*—A. L. Lieberman, Jl. Pharm. and Exp. Therap., Sept., '30,69.

ECLAMPSIA.—Hyperguanidinæmia is associated with hypocalcæmia. 7 Gm. (total) of Calcium Gluconate intravenously, intramuscularly and subcutaneously, cured in 24 hours. Eclamptic syndrome yields to Calcium medication.—B.M.J.E. ii./30,42.

ŒDEMA of children suffering from nephrosis treated.—B.M.J.E. i./31,102.

MILK FEVER cured by injecting Calcium Gluconate: also prophylactic.—L. ii./30,411.

Tetanol (T.M. 521153). *Syn.* CALCIUM LÆVULINATE (Crookes).
Contains 13% Calcium. *Dose.—Intravenously,* 5, 10, or 20 Cc. 10% solution; *Intramuscularly,* 2 Cc. 25% solution. In treatment of tetany and Calcium deficiency diseases.

Chronic tetany cured by 21 daily intramuscular injections of 5 Cc. 3% solution.—T. Izod Bennett, L. ii./31,403. *See also* G. Slot, *ibid.* 556.

Calcii Hydras. $Ca(OH)_2=74{\cdot}0956$. Should be recently made by action of water on calcium oxide. Has slight caustic action. Is more soluble in cold water than in hot.

Liquor Calcis is given to infants with milk.

Warts (verruca plana) on the back of the hand are stated to have been cured in a week by ½ pint a day.

Linimentum Calcis. (*B.P.* '14).
Solution of Lime 1, Olive Oil 1; or with Linseed Oil 1, is known as **Carron Oil.**—*Syn.* LINIMENTUM CARRON. Mid. H. and U.S. X.

Eucalyptus Oil 1 to 2% is sometimes added as antiseptic.

In the tropics Arachis and Sesame Oil are permitted.

Burns are treated with it, but it is thought to be out of date. Tannic Acid is now advised, *q.v.*

Calcii Sulphas. $CaSO_4,2H_2O=172{\cdot}1712$.

Dose.—20 to 30 grains daily (**1·2 to 0·2 Gm.**).

A heavy white powder soluble in water 1 in 390.

For phosphaturia is considered a specific; it may be given with an equal weight of Heavy Magnesium Carbonate.

Dried Calcium Sulphate, $2CaSO_4,H_2O = 290{\cdot}2956$, so long as it remains dry, is used to make Plaster of Paris splints. Two pounds require about one pint of water; this sets rapidly and firmly.

Moistening with 5% Dextrin Solution makes a strong dressing but sets slowly. Sodium Chloride 1% added hastens setting but 2% retards.

Plaster of Paris Bandages, 2, $2\frac{1}{2}$ and 3 inches wide (6 yards). In sealed tins. **Crinoline Bandages** are used for these and for silicating (*cf.* Sodii Silicas).

Calx Sulphurata (*B.P.* '14). *Syn.* Calcii Sulphidum Crudum; Canton's Phosphorus. Contains not much less than 50% CaS=72·14.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) in pill.

Some forms of it shine in the dark and are used in luminous paint. See P.J. ii./15,806; (CaS.)i./16,105, also Radium Luminous Paints.

Is prepared by reducing Calcium Sulphate by charcoal. A greyish powder with sulphuretted odour sparingly soluble in water with decomposition. It thus represents the properties of Harrogate, Barèges, Gilsland, and similar springs. Largely used for boils, carbuncles, acne, scrofulous sores, especially in glands of the neck. It rarely purges even in 2 grain doses thrice daily. Some give small doses *every hour*.

In bronchitis and phthisis where sputum is tenacious and ropy, cough hard and prolonged—Calcium Sulphide liquefies sputum and makes cough easier. In abscess of the middle ear, urinary tract, acne, and, wherever there is pus formation, Calcium Sulphide should be given. In follicular tonsillitis $\frac{1}{2}$ grain may be given every hour until alleviation, then every two hours, said to act as specific. In zymotic diseases, Calcium Sulphide probably finds its most useful place. In the treatment of contagious diseases of childhood Calcium Sulphide seems to act similarly to Antitoxin—that is, it increases the inherent power of the blood to destroy bacteria and their poisons. Should be given throughout the course of measles, scarlet fever, diphtheria and whooping-cough.—Clin. Med., Jan., 1911.

Reading that Calcium Sulphide is specific for Follicular Tonsillitis, and having had this trouble for nine years, with only temporary disappearance of the lesions from medical treatment, a patient tried Calx Sulphurata, 1 grain pills, 3 per day. Supply of pills ran out in twenty days, but during this time tonsils had healed perfectly and there was no sign of relapse 60 days after last taking the pills. Extent of treatment not thought sufficient. Control of the disease also by Lactic Acid 25% solution as swab.—S. M. Klages.

Pilula Calcis Sulphuratæ, $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, and 1 grain.

Tablets contain $\frac{1}{4}$, $\frac{1}{2}$, and 1 grain. Keep in bottles.

In strumous ophthalmia, as well as in periostitis and alveolar abscesses has been found of service. For boils give 1 grain *t.d.*, increased to 8 grains *p.d.*

Stearettes of Calcium Sulphide, freshly made, should prove useful in suppurative conditions in fairly large doses, *e.g.*, 1 grain in each. They would avoid decomposition in the stomach.

otio Calcis Sulphuratæ. *Syn.* LIQUOR CALCIS SULPHURATÆ. Slaked Lime 4, Sublimed Sulphur 4, Distilled Water 35. Boil together, evaporate, and filter, to produce 20 of solution. Diluted with n equal quantity of warm water is a remedy for itch, which it will ure in half an hour. It resembles in composition **Vlemingkx' olution.** (**Calcium Sulfuratum Solutum.**—P. Helv.).

For eczematous itching, baths of the Solution, 1 tablespoonful to very 7 gallons of water, have been used.

In scabies found too irritating for use. Not equal to a weak ulphur Ointment in curative effect.—B.M.J. ii./17,468. Freshly recipitated Sulphur has been used by washing the patient first ith a dilute Sodium Hyposulphite Solution and then with dilute ydrochloric Acid. Subsequently to allay irritation, Sulphur intment.

ulphurated Lime Depilatory.

Milk of lime charged with sulphuretted hydrogen.

yrupus Sulphatum (H. P. Symonds).

Dose.—½ an ounce (15 Cc.) contains appropriate doses of the sulphates of erberine, Quinine, Iron, Potassium and Sodium. Is useful for boils, &c. aken twice or thrice daily.

ilula Sulphatum.

The salts of ½ an ounce of this syrup in two pills.

Calcium Metal, Calcium Carbide, Cyanamide, and further matter on leach, also Estimation of Lime in Blood, Urine, etc., see Vol. II. alcium Lactate and Lactophosphate are under Acid Lactic, Vol. I.

CAMPHORA.

$C_{10}H_{16}O = 152{\cdot}1248.$

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Camphor is a white crystalline substance obtained from *Cinnamomum camphora* (*Lauraceæ*) in Formosa and Japan. (ESSENTIAL IL OF CAMPHOR is of a pale straw-colour or darker, with fragrant lour, Sp. Gr. 0·898 to 0·920; consists principally of a terpene, ith about 1 in 4 or less of camphor in solution, the heavy variety preferred for massage in rheumatism. The heavy Oils range from 975 to 1·025, 50 to 75% Safrole. Light fractions practically evoid of same.—P.J. ii./o8,62). Camphor is sold in bells, and in , ⅓, ½, 1 and 4 ounce cubes, also as **Flowers of Camphor**. The tter is a convenient form for dissolving.

Melting Point 175° C., Boiling Point 204° C.—P. Jap.

Soluble in water, 1 in 700, in alcohol 90% 1 in 1¼ (more soluble absolute alcohol), in ether 12 in 7 barely, chloroform 4 in 1 scarcely, olatile and fixed oils (olive 1 in 3), in glacial acetic acid 2 in 1.

It is rendered more soluble in water by the presence of carbonic acid, acid rbonate and carbonate of magnesium, sugar, and myrrh, and less soluble bromide of potassium, liquor potassæ, sulphate of magnesium, alkaline rbonates and many other salts.

Camphor, when mixed in certain proportions with many crystalline substances, causes mutual liquefaction of the two—*e.g.*, camphor 4, phenol 12, and water 1 (*see* Acidum Carbolicum); camphor 1, and chloral hydrate 1 (*see* Chloral Hydras); camphor 2 and menthol 3 (*see* Menthol), camphor 1 and thymol 1 (*see* Thymol); camphor 2 and β-naphthol 1 (*see* Naphthol); camphor 2 and salol 3 (*see* Salol); camphor and butyl-chloral hydrate liquefy when heated, but solidify on cooling; so will camphor 84 and salicylic acid 65 (*see* Camphora Salicylata). Camphor is powdered by rubbing with a few drops of alcohol.

(**Camphora Synthetica.** P.G. VI. may be used in place of Natural Camphor in Germany, also in Spain as stated in F.E. VIII. *Further details see Vol. II.*)

Synthetic Camphor made on large scale at Adlershof.—P.J. i./31,379.

Flavoring.—Extractum Glycyrrhizæ Liquidum.

Uses.—Sedative, anti-spasmodic, carminative, expectorant, diaphoretic, anaphrodisiac, antiseptic, given internally to abort colds in the head, to relieve hiccough, for whooping cough, diarrhœa, chordee and lumbago. Is injected as a stimulant for patients *in extremis*.

For arteriosclerosis and for old patients with heart trouble continued use of camphor internally is of value.—L. i./18,143.

Meningitis caused by camphor liniment has been treated by caffeine injection. Cases of Camphor habit have been reported.

Caution.—It is dangerous to place camphor or menthol, *e.g.*, a 20% ointment, into the nostrils of an infant. A small quantity of this camphor ointment applied in this way for coma in an infant of 9 months caused immediate collapse with signs of a severe syncopal attack.—Pres., July, 1913.

Poisoning from 75 grains of Camphor as Camphorated Oil. Recovery. Stomach washed out and several ounces Concentrated Magnesium Sulphate Solution left in.—J. Cottrell, B.M.J. i./31,96.

Camphor Water. (*Syn.* Camphor Julep or Mixture) 1 in 1,000.

The **Ammoniated Liniment** (—*Poisonous, not to be taken*) 12½%, with Lavender Oil 0·5%, and Strong Solution of Ammonia 25%, Alcohol 90%, *q.s.*, **Spirit** 10% (and U.S., *Syn.* **Teinture de Camphre Concentrée, Alcool Camphré** Fr. Cx.), and **Compound Tincture** 0·3%, of the *B.P.* '14, are in general use.

Aqua Sedativa. Eau Sedative. Lotion Ammoniacale Camphrée (Fr. Cx.). Spirit of Camphor (10%) 10, Sodium Chloride 60, Solution of Ammonia 60, Distilled Water 1,000, all by weight. As a compress for migraine and rheumatism, and to contusions.

Teinture de Camphre Faible, Fr. Cx. is 1 in 40 Alcohol 60%.

Camphor Ball.

Spermaceti 4, White Wax 12, Oil of Almonds 5; melt in a water bath and add Flowers of Camphor 4. Dissolve, and when nearly cold pour into moulds. Useful for chapped skin.

Camphorated Chalk.

Flowers of Camphor 1, Precipitated Calcium Carbonate 7. Mix, and sift for use as a dentifrice.

Camphorated Carbolic Acid, *vide* **Acidum Carbolicum.**

Elixir Camphoræ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Spirit of Camphor 10, Syrup 5, Distilled Water 1. Contains 1 in 16. It mixes and diffuses well in water.

Æther Camphoratus, P. Helv. Camphor 1, Æther 9. Dissolve.

Linimentum Camphoræ (*B.P.* '14). Camphor 1, Olive Oil 4, by weight. U.S. is the same strength in Camphor to be prepared with Cotton Seed Oil—Oleum Gossypii Seminis expressed from *Gossypium herbaceum* and other species—*Malvaceæ*.

In preparing this, '*English-refined*' flowers should be rubbed through a sieve, and dropped into the oil at 70° to 80° F. Foreign flowers give muddy solution. **Oleum Camphoræ Forte, P.G.V.** is the same strength.

Examination of camphorated oil for camphor substitutes.—P.J. i./09,3.

Wesson Oil, is a high grade of Cotton Seed Oil, largely used in America as Salad Oil, said to be superior to Olive Oil for making Mayonnaise.

Cotton Seed Oil unsatisfactory for Camphor Liniment. Likely to congeal to consistence of cheese.—J. J. Blackie, P.J. i./31,17.

Oleum Camphoratum, Huile Camphrée Fr. Cx. 1 to 9 of Olive Oil.

Injectio Camphoræ Hypodermica.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Camphor 1, Sterile Olive Oil to 5.

In pneumonia 25 minims has been given as a general rule to start with, but much larger doses have been employed—even 12 Cc. of a 20% solution.

Huile Camphrée Stérilisée pour Injection, Hypodermique. Fr. Cx. Touv. Supp., 1926. *Dose.*—Max. during 24 hours, 100 Cc. *Caution.*—A 10% v/v solution in Olive Oil.

Injectio Camphoræ Hypodermica (Aetherea) L.H.

Camphor 2 grains, Ether 3 minims, Olive Oil to 10 minims.

Sterules, Hypodermic, contain Camphor 1½ and 3 grains in Sterile Olive Oil; **Sterules of Camphor** ½ grain, **with Ether** 15 minims; also **Sterules** of Camphor 3 grains with Guaiacol 2 grains, employed in phthisis.

N.F. uses Cottonseed Oil as a solvent for the Camphor.

Curschmann's Solution.

Dose.—15 minims (**1 Cc.**) increased if necessary.

Camphor 2, Ether 3, Olive Oil 7.

Sterules of Curschmann's Solution 1 Cc.=**0·2 Gm.** (3 grains) of Camphor are prepared.

Cardio-vascular Diseases treated by Camphor. During the course of chronic myocarditis with simple cardiac insufficiency, changes in rhythm and auricular fibrillation, no drug can compete with Camphor in sustaining activity of the heart and steadying the pulse. *Dose.*—0·1 Gm. (1½ grains) in oil hypodermically once or twice daily—or *per os*. Not merely a remedy in the hour of death, but used intelligently can be given with benefit throughout the entire course of various cardiac and vascular diseases.—L. ii./17,466.

Heart Failure in typhoid and pneumonia (and other causes, *e.g.*, gassing by chlorine and where the patient is *in extremis*). It is one of the most valuable excitants we possess.—U.S.D.

Gastric Hæmorrhage is stated to have been arrested by the injection. Not suited when there is insufficient active carbohydrate metabolism.

Sciatica and Neuritis well treated.—Jensen, B.M.J.E. i./20,17.

Engorgement of Breasts.—Intramuscular injections of 1½ grains of value. Has inhibiting action on milk secretion. Give two injections, the first day and one for each of next three days.—W. Philphot, Jl. A.M.A. ii./29,65.

Caution.—Various amounts (30 to 300 Cc.) of 1 to 10% solution have been injected. A case recorded of acute poisoning from 170 Cc. of 10% solution after an operation. 1% may be safe and not more than 300 Cc. of this solution.

Urticaria following the use of injections.—Per Jl. A.M.A. ii./25,476.

Ⓟ **Pigmentum Camphoræ Chloral et Menthol.**

ACUTE FIBROSITIS.—In early stage hot fomentation useful. Afterwards apply Camphor, Chloral Hydrate, and Menthol, *p. aeq.*, painted on and rubbed in gently with the fingers—or paint with Iodine Tincture, and apply hot poultices or very hot fomentation.—A. P. Luff, B.M.J. i./16,858.

Pilula Camphoræ.

To form camphor into pills use $\frac{1}{3}$ its weight of powdered curd soap and a few drops of alcohol, or a little lard in a warm mortar.

Tablets, Camphor and Quinine. Camphor $\frac{1}{4}$ grain, with Quinine Acid Sulphate 1 grain. To check catarrh, and as a tonic.

Spiritus Camphoræ Fortior. *Syn.* RUBINI'S SOLUTION.

Flowers of Camphor 1, Absolute Alcohol (by weight) 1. *Dose* for diarrhœa.—2 to 5 drops on sugar every 5, 10 or 15 minutes, according to the severity of the symptoms.

Trochisci Camphoræ contain 2 grains in each.

Wool, Absorbent, **Camphorated** (33%).

Acidum Camphoricum. PH. NED. V., P. HELV., P. JAP. IV., F.E. VIII. $C_8H_{14}(COOH)_2=200{\cdot}1248$.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**) in cachets.

Formed on oxidation of camphor with nitric acid (test for free nitric acid with ferrous sulphate). Odourless crystals, M. pt. 187° C.

Soluble in water about 1 in 200, in alcohol 90% about 1 in $1\frac{1}{2}$, and in fatty oils about 1 in 10. It is dextrorotatory.

Uses.—With success in night sweats of phthisis, also in cystitis by intravesical injections of 2% aqueous solution with 11% alcohol and as an intestinal disinfectant. Further in solution as a local astringent for nose and throat, also for diarrhœa. In skin affections saturated solution in dilute alcohol locally useful.

Camphora Monobromata, $C_{10}H_{15}BrO=231{\cdot}033$.

P. Helv. directs—gradually combine Camphor 15, Bromine 16 in a mortar. Also official in P. ITAL. V., P. JAP., F.E. VIII., P. BELG. IV., and PH. NED. V.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in pills, with $\frac{1}{3}$ of its weight of curd soap and proof spirit *q.s.*

In colourless prisms, soluble in ether, alcohol, and fixed oils, insoluble in water. Should be soluble in sulphuric acid with nearly colourless solution. M. Pt. 76° C.—P. Jap. It is used as a hypnotic, and of value in epileptic vertigo, cases of petit mal, chorea, hysteria, delirium tremens, whooping-cough and asthma, and for erections in gonorrhœa.

Tablets contain 1 grain (**0·06 Gm.**). **Perles** 2 grains (**0·12 Gm.**).

Elixir Camphoræ Monobromatæ.

Monobromated Camphor 1, Spirit of Cinnamon (1 in 10) 10; dissolve and add Red Elixir 60, Syrup *q.s.* to 100. *Dose.*—$\frac{1}{2}$ an ounce.

Enuresis is treated with this combined with belladonna, where potassium bromide is unsuitable.

Camphora Salicylata. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**), in pill, with suet or lard.

Camphor 56, Salicylic Acid 44, combined. Soluble about 1 in 20 in oils and alcohol. As ointment in skin affection.

Trochisci Camphoræ Salicylatæ Compositi. Camphor Salicylate 2 grains, Sodium Sulphate 4 grains. One thrice daily an hour before food. To ward off a cold.

Coramine (T.M. 437910). *Syn.* PYRIDINE-β-CARBONIC ACID DIETHYLAMIDE
Dose.—1 to 2 Cc. of the liquid, with a little water orally. 1 to 2 ampoules, each 1·1 Cc., hypodermically, intramuscularly, or intravenously.
Uses.—In shock, heart asthenia following infectious diseases (pneumonia, etc.) arteriosclerosis, renal affections, bronchial asthma, emphysema, poisoning through narcotics, and asphyxia of the new-born.
A substitute for Camphor, Strychnine and Caffeine, since in cases of collapse it has a stimulating action on central nervous system and on the circulatory and respiratory apparatus. It has the advantage of being water-soluble and non-cumulative. Pharmacological and clinical results are given.—E. S. Faust, M. i./25,1336; C.D. i./25,880; B.M.J. ii./25,910.

Cardiazol (T.M. 475209). *Syn.* METRAZOL PENTAMETHYLENETETRAZOL $(CH_2)_5=N-N=N-N$.
Dose.—1½ grains (0·1 Gm.) *per os.* Ampoules containing 1·1 Cc. are supplied for subcutaneous use.
A colourless crystalline powder, M.pt. 56—58° C., readily soluble in water and other solvents. Solutions can be sterilised. Has many of the properties of Camphor. **Tablets** contain 0·1 Gm. For use in collapse and heart affections.
Cardiazol-Ephedrine.—1 Cc. = 0·1 Gm. Cardiazol with 0·015 Gm. Ephedrine. In pneumonia and heart affections: acute asthmatic attacks. May be given *per os* or hypodermically, but not intravenously.

℗ **CANNABIS INDICA** (*B.P.* '14). U.S., F.E. VIII., P. BELG. IV.

℗ *Cannabis and Resins from it—vide Poisons Schedule.*

℣ *Extract and Tincture of Indian Hemp.*

The dried flowering or fruiting tops of the pistillate plant of *Cannabis sativa* (*Urticaceæ*). It is grown in India (not deprived of resin).

The masses obtained in European commerce are called Guaza. Ganja differs slightly and is more active. Bhang or Hashish consist of the leaves, small stalks and fruits.

The therapeutic value of the drug is contained in the resin. It appears to contain no peculiar alkaloid. The constituent **Cannabinol** becomes oxidised on exposure to the air. For use in medicine it should be as fresh as possible. It is a powerful drug.

A high export duty is imposed on it. *N.B.—The B.P.* '14 *dose of Extract has proved toxic.*

History of Cannabis.—Sir David Prain, B.M.J. ii./25,963.

For details of Assay and Physiological Examination, see Vol. II.

'**Mariahuana**'—the official name for Cannabis Indica in Mexico. Large quantities seized by Customs. Forbidden import and growing.—L. i./26,426.

Antidotes.—Stomach pump, emetics, stimulant draughts, artificial respiration, coffee. No death from cannabis is on record.—H.

Effects of large doses of Cannabis Indica depicted by the author's experiment on himself. There is a distinct unmistakable sex tinge to its action, exhilaration and emotion.—A. Schneider, per P.J. i./23,389.

Flavoring.—*Vide* Tinctura.

Uses.—For chordee and asthma, also as an aphrodisiac, and is successful in migraine. Is a narcotic and anodyne, but may give peculiar dreams and even delirium.

It is useful in dysmenorrhœa, especially with Gelsemium; with Nux Vomica in incipient delirium tremens, nausea, and paroxysmal colic,

supraorbital neuralgia, cough of phthisis and for whooping cough. It is of great use combined with strychnine, with chloral in chorea in mental worry and restlessness. Should be given in small and frequent doses. It is *the* remedy for menorrhagia.

In gonorrhœa (urethritis acuta anterior) Cannabis internally with Hyoscyamus is useful before patient is in condition for injections.

HEADACHE DUE TO HIGH BLOOD PRESSURE well treated, especially where chronic interstitial nephritis is a contraindication to Blue Pill.—A. Feiling, B.M.J. ii./30,907. See also **Vinum Antimoniale.**

℞ ℙ1 **Extractum Cannabis Indicæ** (*B.P.* '14). *Syn. Extract de Chanvre Indian.* FR. CX. Nouv. Supp. '26. In U.S. is *assayed biologically.*

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**), in pill with lycopodium. An alcoholic extract, of which 1 dissolved in alcohol 90% *q.s.*, to 20 forms—

℞ Ⓟ **Tinctura Cannabis Indicæ** (*B.P.* '14). (A 1 in 10 of Alcohol Tincture was in U.S. IX.; assayed biologically.) *Dose.*—5 to 15 minims (0·3 to 1 Cc.), in some mucilaginous fluid.

Flavoring.—Glyl Lavandulæ, Glyl Amygdalæ Amaræ, Glyl Pini, Syl Vanillæ; Syrupus Aurantii, Syrupus Zingiberis.

℞ Ⓟ **Fluidextractum Cannabis, U.S.** 1=1. An alcoholic percolate assayed biologically. *Dose.*—1½ minims (**0·1 Cc.**).

℞ Ⓟ **Pilula Extracti Cannabis Indicæ,** contain $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain.

In sciatica a pill of Cannabis Extract and Hyoscyamus Leaf in powder of each 1 grain may help. Local treatment. *Dose.*—2 to 5 during the day.

Ⓟ **Cannabin Tannas.**

Cannabin Tannate not a 'D.D.'—P.J. ii./29,462.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) taken an hour before bedtime in a pill or in sal volatile and water.

A brownish powder, soluble in alkaline water and alcohol, said to be a useful hypnotic and is specially valuable in nervous sleeplessness and in acute mania; also for dysmenorrhœa and menorrhagia.

Ⓟ **Pilula Cannabin Tannatis,** 2, 3 and 4 grains.

ℙ1 CANTHARIS.

ℙ1 *Cantharides and its poisonous derivatives.*

Ⓟ *Cantharides, Tincture and all vesicating liquid preparations and admixtures of (and N.B. last clause of Part II. of Schedule).*

Syn. LYTTA; SPANISH OR BLISTERING FLY.—P. Jap. IV. has *Epicauta Gorhami* with 1% Cantharidin.

Dose.—$\frac{1}{16}$ to $\frac{1}{2}$ grain (**0·004 to 0·03 Gm.**) in pill. Better given as tincture. FR. CX. Max. single dose $\frac{3}{4}$ grain. Max. in 24 hours, 2 grains.

Antidotes.—Emetics, stomach pump, white of egg (no fats); sedatives. *Cantharidin poisoning.* 1/50th grain taken.—L. ii./21, 654. *See also* Liquor Epispasticus.

For note on Estimation of Galenicals, see Vol. II.

A study of *Cantharides* in practical pharmacognosy.—T. E. Wallis, P.J. ii./27,167.

Uses.—Externally vesicant, irritant and powerful counter-rritant. Used in pleurisy, pericarditis, meningitis, neuritis, applied bove the stomach to stop vomiting and in rheumatoid arthritis, *v.* Emplastrum).

Internally is said to have aphrodisiac properties. Has been given n lupus and in chronic gout. Caution, avoid irritation of the kidneys. Hæmaturia is checked by five-minim doses of tincture. It is of ervice in incontinence.

In cardiac dropsy Cantharides is one of the most useful means of romoting diuresis. It acts on the secreting cells of the tubules, and he effects manifest themselves quickly. Dose of Tincture may be 2, or 10 minims according to age, given several times daily. Can sefully be added to a mixture containing Caffeine, Tincture of trophanthus and Spirit of Nitre.

℗ **Mylabris phalerata** and *sp.* are not now official but were in I.C. dd. for making external applications in India. These contain bout 1 to 2%, or more than double the amount in Cantharides, f the neutral principle—

℗ **Cantharidinum** (*B.P.* '14), P. Ital. V., P. Helv., F.E. VIII., P. Belg. IV. $C_8H_{12}O\ (CO)_2O = 196{\cdot}0936$.

Cantharidin is the Lactone of Cantharidic Acid, in flat glistening ectangular prisms, which melt at 210° C. approx., and volatilise in ery irritating white fumes. ***Soluble*** 1 in 56 of chloroform, 1 in 8 of acetone, and about 1 in 150 of acetic ether. Soluble also in ther, benzene, glacial acetic acid, 1 in 1,000 of absolute alcohol, and bout 1 in 400 of water (Greenish).

Poisoning Effects and Antidotes, see *Cantharis.*

Uses.—Solutions of Cantharidin, as well as other preparations of antharides, are employed for stimulating the growth of the hair, in lopecia, and preventing its falling off.

℗ **Acetum Cantharidini** (*B.P.*'14) contains Cantharidin 1 in an cetic Acid solution *q.s.* to 2,000.

℗ **Linimentum Crinale** (Squire).

Cantharidin 1 grain, Acetic Ether 6 drachms ; dissolve with gentle eat, and add Alcohol 90% 6 ounces, Castor Oil 2 ounces, Lavender il 15 minims. It is better to dilute this with an equal quantity of pirit, and the head should be washed after applying it a few times, o prevent the cantharidin accumulating.

℗ **Emplastrum Cantharidini** (*B.P.* '14), contains Cantharidin 1, in basis of Beeswax 225 and Wool Fat *q.s.* to 500 previously melted.

℗ **Emplastrum Calefaciens** *B.P.* '98.—Was $\frac{1}{10}$ strength of this.

℗ **Emplâtre Mouches de Milan** used in France is similar to mplastrum Cantharidis *B.P.* '98.

In rheumatoid arthritis counter-irritation is of value. Cantharides plasters in. or 5 in. by 2½ in. painted immediately before application with Cantharides iniment or Liquor Epispasticus to increase effect, are applied at bed time, ne on each side of the seventh cervical vertebra or the twelfth dorsal, according s the joints of the upper or lower extremities are most affected—leave on r 24 hours. If the kidneys are unhealthy electric cautery should be used

instead. After blistering and cutting away the loose cuticle a bread poultice made with Boric Lotion is applied over night. Next morning dress with fresh Savin ointment and repeat every eight or ten days—soak well with Boric Lotion in removing. Twenty drops of Laudanum at night useful. Pain and swelling of joints generally much relieved after three or four days.—Latham, R.S.M. Baln. Sectn., May, 1910, p. 110, or L. i./10,929.

The theory is that the changes in the joints and muscular wasting are due to active and destructive lesions in the spinal cord, and especially the cervical and lumbar enlargements.—B.M.J. i./13,864.

Ⓟ **Emplastrum Vesicans.**

Cantharidin 1, Chloroform *q.s.*; heat to dissolve and add to Yellow Wax and Wool Fat, in equal portions, previously melted together, 499.

Ⓟ **Liquor Epispasticus** (*B.P.* '14) is now made about same strength as *B.P.* '98, using Cantharidin.

Effects of painting the side with the Liquor to the size of a surface measuring 7 by $2\frac{3}{4}$ inches—in error. Blood, albumin, kidney cells passed in the urine.—L. ii./08,800.

Ⓟ **Collodium Vesicans** (*B.P.* '14) is approximately the same strength.

Lotio Ammoniæ et Cantharidini Mid. H.

Strong Ammonia Solution 1, Spirit of Rosemary 2, Alcohol 90% 4, Tincture of Cantharidin 2, Almond Oil 6.

Ⓟ **Linimentum Cantharidis Compositum**, W.H.

Liquor Epispasticus 30, Glacial Acetic Acid 20, Rosemary Oil 3, Castor Oil 90, Alcohol 90% to 480.

Ⓟ **Emplastrum Cantharidis Liquidum**, a special preparation, is painted on with a brush. It dries rapidly, forming a pellicle on the skin. Effect more certain than with a plaster.

The size of a blistering plaster is usually 1 inch square—rarely more than 2 inches square. For applying behind the ear the shape should resemble that of the space formed when the tip of the forefinger comfortably touches the tip of the thumb.

Ⓟ **Oleum Cantharidatum. P. Jap. IV.**

Macerate Cantharides in powder 3, in Olive Oil 10, on the water bath for 10 hours with occasional shaking. Strain.

Ⓟ **Tinctura Cantharidini** (*B.P.* '14) 1 in 10,000; is approx. $\frac{1}{7}$ strength of F.I. *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.**). U.S. 1 of Cantharides in 10 of Alcohol (94·9% vol.) containing Glacial Acetic Acid $\frac{1}{2}$. *Average dose* $1\frac{1}{2}$ minims.

Fr. Cx. and P. Ital. V. 1 of Cantharides in 10, Alcohol 70%. (F.I.) Max. single dose 9 minims and max. during 24 hours 25 minims approx. F.I. (Second) recommended 0·06% Cantharidin.

Ⓟ **Unguentum Cantharidini** (*B.P.* '14).

Contains Cantharidin 1, dissolved by means of Chloroform in Benzoated Lard, 3000.

One part diluted further with two of soft paraffin forms a useful pomade for stimulating growth of the hair.

Erasmus Wilson's Ⓟ **Unguentum Stimulans** is described as consisting of 1 of Cantharides in 5 of plain lard.

Ⓟ **Unguentum Cantharidin cum Hydrargyro Compositum** is sold as 'Pomade Max.'

Ⓟ **Unguentum Hydrargyri Oxidi Rubri et Cantharidis**, W. H. Blistering Liquid 15 minims, Red Mercuric Oxide Ointment 1 ounce.

℞ **Potassii Cantharidas.** Fr. Cx. ($+1H_2O$).
$C_8H_{12}O(COOK)_2,2H_2O=326{\cdot}3248$.

Dose.—$\frac{1}{400}$ to $\frac{1}{200}$ grain (**0·00015 to 0·0003 Gm.**) hypodermically in very dilute solution. In minute white needles, soluble 1 in 25 of water. Has properties representative of Cantharidin, *q.v.*

CAOUTCHOUC.

India-Rubber. *Syn.* Elastica. (*B.P.* '98.)
The prepared milk-juice of *Hevea brasiliensis* (*Euphorbiaceæ*) and other species; known in commerce as Pure Para Rubber.

Preservation.—The best means of preserving rubber goods is to immerse completely in distilled water.

Liquor Caoutchouc (*B.P.* '98). Caoutchouc 1, Benzol 10, Carbon Bisulphide 10. Treat the rubber with the carbon bisulphide for an hour or two to form a jelly, and add the benzol. It may be medicated, but **Traumaticin** is preferable.

Bandages of rubber are (i.) webbed with strands of rubber; (ii.) Statham's porous; (iii.) Martin's (solid) perforated and non-perforated; (iv.) Elastic Circular Stocking and India-rubber Webbing.

Bougies of solid elastic gum:—
With bulbous end = à Boule, in sizes 1 to 16.
,, ,, silk web ,, ,, ,, 1 to 16.
Conical pointed in shape ,, ,, ,, 1 to 12.
Cylindrical, not tapered, various textures and materials—Sizes 1 to 16.
Æsophageal Bougies are bulbous, conical and cylindrical, of elastic gum.—Sizes 10 to 24.

Catheters.—Elastic gum, black and webbed, or silk web:—
Bulbous (à Boule).—Sizes 1 to 16.
Coudé (bent at end) also Bi-Coudé with two bends.—Sizes 5 to 12.
Cylindrical.—Sizes 1 to 15, with or without wire Stilettes, and sizes 5 to 12 with solid or hollow ends.
Conical (simply pointed, *i.e.*, tapered), with wire Stilette.—Sizes 1 to 12.

Catheters, Soft Rubber.—13 and 16 inches long, with and without funnels, and the sizes vary between 4 and 12.
Belfast linen Catheters are also prepared.
Web Catheters may be sterilised by boiling in nearly saturated solutions of Ammonium Sulphate or Sodium Chloride, washing afterwards in sterile water.

Catheters, Female, are of glass, straight or curved, metal, or soft rubber.

Dental Rubber, manufactured of pure para rubber and coloured. This is supplied in various shades of colour, *e.g.*, white, pink, red, orange, black. The varieties in commerce are designated 'Samson,' 'Doherty,' 'Gold Dust,' Ash's 'Whalebone,' and Jamieson's 'Horn.' The rubber is hardened by vulcanisation and used to form a frame to carry artificial teeth. In vulcanising most rubber, especially Ash's, raise the temperature gradually until 315° F. or 100 lbs. pressure is obtained. Maintain this temperature or pressure 75 minutes to complete vulcanising process.

Drainage Tubing is of various dimensions, and is supplied in Carbolised solution in glass tubes.

✱ **Elastoplast** (T.M. 493126) **Bandages.**
Self-adhesive, resilient elastic plaster bandages, available in widths 2½ and 3 inches and length 3 yards.
These bandages have recently been much used as a tight binder for varicose veins and ulcers, both for support and for fixing Zinc Gelatin dressings.
They also provide compression and support for the after-treatment of fractures and dislocations, injuries to joints, tendons, muscles, etc., fracture of ribs, clavicle, femur, Colles' fracture, etc.
X-Ray photographs can be taken through several layers of Elastoplast.

Varicose Ulcers.—Put the hydraulics right, and the ulcer will take care of itself. The varicose circulation should be squeezed out of existence. The ulcers should be hermetically sealed with sticking plaster, as found by Bayton 150 years ago. ***In Technique 5% Sodium Morrhuate Injection*** and a ***3-inch Elastoplast*** bandage. Discharge occurs and is beneficial. Enormous cost of patients of this kind to the State. *Some* probably £5,000 each. 324 patients cured.—A. Dickson Wright, B.M.J. ii./30,996. See also 'Chronic ulcer of the leg treated by Dickson Wright Method.' There is no danger of putting the bandage on too tight and no danger of imprisoning septic secretions of the foulest.—J. H. Twiston Davies, and A. E. Drynan, B.M.J. ii./30,998.

Reflux pressure in the veins may upset the hydraulics on removing bandage. Single long veins easiest to treat.—F. A. E. Silcock, B.M.J. i./31,34.

Varicose ulceration. Compression, or squeezing of excess fluids out of the limb. Very tight bandaging required.—J. H. Twiston Davies, B.M.J. i./31,201.

Support is given which skin and tissues have lost and the blood is made to circulate properly. Patients should walk about.—Sir L. Hill, B.M.J. i./31,240.

Method beneficial.—H. Haldin-Davis and others.—B.M.J. i./31,329,330.

Painting the leg with ***5% Ichthyol in Glycerin prevents irritation.***—R. W. Cockshut, B.M.J. i./31,652.

Varicose Vein Clip to apply over site of injection, to take the place of an assistant.—R. Davies-Colley, B.M.J. i./30,156.

Gloves, Surgical, are prepared smooth and rough surface. We had occasion to submit a brand known as the '**Veedip**' to sterilisation tests (1927) and found same to withstand repeated heatings with highly satisfactory results comparative with ordinary rubber gloves. A brand termed **Tensile** is made under Patent 208235.

Gutta Percha Tissue is prepared from Gutta Percha, the dried milky juice of *Palaquium oblongifolium* and other trees belonging to the *N.O. Sapotaceæ*. Contains about 80% gutta similar to that of caoutchouc.

The tissue has been used after sterilising in spirit as a wound-dressing.

It is not flexible like indiarubber. It cannot be vulcanised by heating with sulphur unless it is first melted with a proportion of indiarubber.

The principal districts of supply are Pahang, Kelentan, Siak, Bolungen and Sarawak. Small quantities are also exported from Siam and Manila, and a lower grade from Nigeria. From Borneo is obtained the well-known 'leaf gutta'; this is extracted from the leaves and small twigs of the tree, and is boiled, cleaned, and pressed into slabs and cakes, considered by some to be the best. Unfortunately on keeping it oxidises and becomes brittle. Gutta percha is the **balata** of the old world, as balata is the gutta percha of the new world.—C. D. Commercial Compendium.

Mackintosh or **Waterproof Sheeting,** 44 inches wide is supplied:—

1. Double texture and double width. 2. Having rubber on both sides.

✲**Vulpro** (T.M. 460806, Cl. 11 and 460807, Cl. 40) Sheeting is made by a new process, it is rot-proof and cannot crack. Made 36 and 40—42 inches wide.

Oiled Calico. Calico treated with boiled oil, and thus rendered waterproof.

Oiled Silk is supplied (*a*) green, (*b*) in the non-adhesive form of yellow colour, and (*c*) a further variety is brown in colour.

Oiled Silk, Dextrinized, is prepared from the best English Oiled Silk by treating the latter with a solution of Carbolized Dextrin.

Oiled Silk Protective. This consists of oiled silk coated on both sides with copal varnish, and when dry, brushed over with Dextrin 1, Starch 2, Carbolic Lotion (1 in 20) 16.

Pessaries are ball shape, butterfly, circular, oval, cradle, and ring form.

India Rubber Plasters are made 7 inches wide and in Tape form.

Stomach Tubes.—That known as Van Valsh's, with bevelled 'Velvet Eyes,' is considered one of the best, but the bevelling may have the disadvantage of weakening the tube on one side and causing it to turn round when an obstruction is met. For passing the tube a special Lubricant Glycerin Jelly is supplied in Collapsubes, or a Glyco-Gelatin Pastil of Menthol $\frac{1}{12}$, and Cocaine $\frac{1}{20}$, is useful. (*Vide* Examination of Stomach Contents.)

Sutures (*vide* Ligatures).

CAPSICI FRUCTUS.

Syn. CAYENNE, AFRICAN PEPPER, CHILLIES.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**), in a pill.

The dried ripe fruit of *Capsicum minimum* (*Solanaceæ*).

Contains as chief constituent Capsaicin—formula variously stated.

apsicin. *Dose.*—$\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003 to 0·006 Gm.**).

Made by extraction with 90% Spirit. It is a dull reddish brown ily mass becoming crystalline.

Gerrard found that Alcohol 90% is a good menstruum for extraction. He repared a 2 in 1 liquid extract, and from this an ointment 1 in 10 with t e fficial basis or hydrous lanolin, also a plaster 10%.

)leo-Resina, Capsici, U.S.

A bright red oil obtained by extraction with ether.

1½ of acetone will exhaust (if percolated slowly) 1 of capsicum. Yield of leo-resin 5 to 16%.—Caspari.

The name Capsicin is not synonymous with the Oleo-Resin.

The word '***Oleoresin***' properly applies to the *ether or acetone extractive.* weighed quantity is dissolved by solution of soda filtered through calico, the olution is then acidified and extracted by ether. The dried ether extract is hen treated with 60 per cent spirit. To prevent any oily acid from passing hrough the filter, stir with calcium sulphate or the like before filtering. The pirit solution is evaporated and the dried extract weighed. A sample of a reparation made with 60% Alcohol gave 10·66 per cent, while one of the true leoresin gave 18·82 per cent.—D. B. Dott, P.J. i./22,64, C.D., 1922,117.

'ilula Capsici Composita.

Capsicum Oleo-resin ½ minim, Clove Oil ½ minim, Calomel 1 grain, Aloes 2 grains. For the atonic stomach of drunkards.—H.

℗ **Emplastrum Capsici.** (℗ *cf.* Emp. Plumbi).

Evaporate the Alcohol from Liquid Extract of Capsicum 10, and tir into Resin Plaster 95. Contains 5% of Solid Extract (Gerrard). J.S. has Oleo-Resin of Capsicum 0·25 Gm. brushed over 15 square 'm. of adhesive plaster.

Capsicum plasters in rubber combination are also made in sheets ' in. by 5 in., and yard rolls 7 in. wide.

Emplastrum Capsici Mite (**Mild for dental use**). R.D.H.

Caoutchouc 10, Yellow Paraffin 1. Heat carefully so as to just liquefy, nd add Resin 10, Powdered Orris Root 4, Finely Powdered Capsicum 4. Mix nd spread on linen and cut into pieces half the size of finger nail. Dry the um thoroughly before application.

Emplastrum Capsici Forte, R.D.H.

Prepare as above, omitting the powdered Capsicum.

Spread and brush the surface thinly with Oleo-Resin of Capsicum *q.s.* Neither of these plasters contains lead.)

Fluidextractum Capsici.

Dose.—1 minim (**0·06 Cc.**) Alcoholic Percolate 1=1. Gerrard dvised the following formula :—

Exhaust Capsicum 100 with 90% Alcohol, distil off alcohol until he residual extract weighs 50,1 of extract=2 of drug, *i.e.*, double the trength of the U.S. VIII. preparation.

Unguentum Oleo-Resinæ Capsici.

Oleo-resin of Capsicum 1, Hard Paraffin Wax 1, White Soft Paraffin 8. Melt the paraffins, add the oleo-resin, and stir until cold. For use as the liniment.—P.J. ii./16,630. May be too strong for tender skins—will bear dilution 2 or 3 times.

Tinctura Capsici (*B.P.* '14). 1 in 20 of 60% alcohol. U.S. X. 1 in a mixture of Alcohol (94·9% vol.) 95 and Water 5, *q.s.* to 10.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Given internally it increases the flow of saliva and gastric juice. Increases peristalsis, relieves atonic dyspepsia, and is useful in dipsomania—it allays the craving for alcohol. *cf.* Mistura Capsici Sedativa, *infra*. The *B.P.* '14 tincture is too weak for external use as a rubefacient.

FILARIASIS is treated prophylactically by Pepper and Capsicum. Tincture of Capsicum found useful in acute filarial fever and lymphangitis.—J. A. Robertson, L. ii./15,673.

Tinctura Capsici Ætherea.

Prepared as *B.P.* '14 tincture, with pure ether *vice* alcohol.

Tinctura Capsici Fortior, B.P.C.

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**). Principally used externally. *Is practically identical with Concentrated Tincture of Capsicum* (Turnbull).

Capsicum 1, Alcohol (90%) *q.s.* to 3. Is useful for chilblains, but only when the skin is not broken.

This is too irritating generally. The writer's formula is :—

Linimentum Capsici.—*Martindale.*

Capsicum Fruit in No. 80 powder 10, percolate with Alcohol (90%) to 70, and add Oleic Acid 10, Oil of Lavender ½. Painted on the skin, or applied sprinkled on piline or flannel, in an hour it produces a red glow ; its action may be arrested by smearing the part with vaseline. Useful in chest affections, rheumatism, sciatica, etc. Does not redden the skin for any length of time, hence may be used on exposed parts.

Linimentum Capsici Duplex is the latter, double strength.

Mistura Capsici Sedativa (anti-alcoholic).—L.H.

Dose.—½ ounce (**15 Cc.**) containing Capsicum Tincture 5 minims, Tincture of Ginger 20 minims, Potassium Bromide and Sodium Bicarbonate each 10 grains, Infusion of Quassia to ½ ounce.

Unguentum Capsici (*B.P.* '14). Capsicum Fruit bruised 25% in a basis of soft and hard paraffin and prepared lard, strained after digesting an hour on the water bath.

Resembles Smedley's Chillie Paste.

The following formula (Gerrard's) is not wasteful of the fats :—

Liquid Extract of Capsicum (1=2 of drug, Gerrard) 60 grains, Olive Oil 1 ounce, Spermaceti 60 grains, melt the fats and stir in the liquid extract. A more absorbent ointment would be liquid Extract of Capsicum 60 grains, Hydrous Lanolin 1 ounce 60 grains.

Capsicum Wool, CALORIFIC WOOL.—Oleo-resin of Capsicum 1, Ether 30, Absorbent Cotton 19. Dissolve the oleo-resin in the ether, saturate the wool evenly with the solution and dry.

Alternative formula (Gerrard) :—

Dissolve liquid extract of capsicum (Gerrard) 2 ounces in alcohol 90% 7 ounces. Pour the solution on to the cotton wool 9 ounces under pressure to saturate evenly. Dry and preserve in well closed cartons. Contains 10% extract. Colour with eosin, as otherwise the colour fades. Cover with oiled silk when applying to increase activity.

L. H. directs to make a tincture by percolating Capsicum 2 ounces with lcohol 70% 10 ounces, and to then impregnate Cotton Wool 16 ounces with his, express and dry.

✱**Capsogen** (T.M. 327250) is a trade variety of the above encased in gauze. **Capsicum Gamgee Tissue** is also made.

All the above are very useful in rheumatic affections, bronchial nd similar painful complaints where warmth relieves.

ARBONIS TETRACHLORIDUM. Ph. Ned. V., F.E. VIII.

Syn. ✱Tetraform (T.M. 445574). $C.Cl_4 = 153{\cdot}828$.

Dose.—The general conclusion is that **3 Cc.** (45 minims) (in several apsules) is adequate, but **6 Cc.** doses have been taken by an adult. 0 to 20 minims is safe for children of 3 to 4 years. Children of 1 ear can have 10 minims; a child of 10 should receive 30 minims; youth of 16, 40 minims (**2½ Cc.**), and so on even when seriously l from various causes. *Milk* is the best vehicle even if given in apsule. Must not be given in spirit or turpentine.

It would be desirable to qualify the above with the following :—

Not the ideal anthelmintic. In addition to the many deaths reported in he literature (some with doses as low as 1½ Cc.) there are many unreported atalities. No justification in morality, science, or expediency in the 'herd,' reatment of backward races.—Clayton Lane, B.M.J. ii./28,195. *See also* . i./30,1317.—***1·5 Cc. is the fatal dose. Very strong remarks epeated.***

See further abstract of this authority's criticisms and those of others, postea.

A heavy, volatile, and mobile chloroform-like liquid, has a pleasant ungent, quince-like odour if pure. Sp. Gr. 1·56. B.pt. 77 to 78° C.

Uses.—It has been extensively used in ***Ankylostomiasis,*** *Syn.* Uncinariasis, Dochmiasis, Hookworm infection.

The vapour inhaled relieves hay fever. Employed locally, prinkled on piline or lint covered with American oiled cloth, it uickly relieves neuralgic pains.

Deaths have been caused by its use as a dry shampoo by hairdressers.—Details in Edn. XVI., p. 810.

For extracting Male Fern, Ginger, etc., not well spoken of.—G. Trease, B.P.C., 1926, C.D. ii./26,257.

REFERENCES TO ANKYLOSTOMIASIS AND OTHER WORM INFECTION.

It aids expulsion of ascaris lumbricoides if followed by purgative, but is not s effective as Chenopodium Oil in killing this. It is not necessary to precede r follow administration by a purge.—L. Nicholls and G. G. Hampton, B.M.J. i./22,8.

Effective in animals.—L. i./22,391,1057. 10 Cc. doses considered a maximum—given to prisoners and tolerated.—P.J. ii./22,295. 10 Cc. doses, in ookworm disease, produced no ill effects. 12 Cc. removed all hookworms nd ascarides.—C. N. Leach, per Jl. Trop. Med., Aug. 15/22,264.

It also expelled *oxyuris vermicularis* and some *trichuris trichiuria* and *ascaris lumbricoides*. It acts as a moderate purge, so it is not necessary to prepare he patient as for thymol. It may be combined with Oil of Chenopodium for scaris.—J. G. Reed, B.M.J. i./23,1048.

Larger doses than 3 Cc. unnecessary and possibly dangerous. Wide variations in individual reaction to drug; 20 Cc. have been given. Alcoholics especially susceptible, 1·5 Cc. having produced toxic symptoms in an acute alcoholic.—W. G. Smillie and S. B. Pessoa, per Jl. Trop. Med., April 16/23,127.

Doubtful whether it is an actual anthelmintic. It has soporific action on hookworm patients.—T. A. Henry, P.J. i./23,28.

Hookworm in Filipinos. Approximately 50% of the adults found to be infested with hookworm.—B. Schwartz and M. A. Tubangui, per Jl. Trop. Med., May 1/23,143.

Report from Fort Benning Hospital, Ga. Vastly superior to Oil of Chenopodium or Thymol.—A. T. Cooper and A. J. Vadala, Jl. Trop. Med., April 16/23,130.

In Fiji 27,000 people treated without a casualty.—S. M. Lambert, per Jl. Trop. Med., Mar. 15/23,92; Col. Rep., Aug. 15/23,61.

Action on the liver.—Inadvisable to prescribe 5 Cc. doses, as an anthelmintic with purgation, let alone without it. 3 Cc., however, appears safe. It is specific for ankylostomes, and is fairly efficient for *ascaris lumbricoides* and *oxyuris vermicularis*, but of little value in the elimination of *trichuris trichiura*. —J. F. Docherty and E. Burgess, B.M.J. ii./22,907.

Surface infection of the soil is only one phase in the free life of the hookworm. The hookworm larvæ spend a considerable part of their life in the soil at various levels. Eggs may hatch out in a few days and the larvæ start then to migrate. —L. i./23,604.

Moderate alcoholism is not a contraindication, providing liquor is withheld two or three days before and after treatment. ***Saline purgatives should not be given immediately before treatment.*** The drug should never be given during the course of an infectious disease. In surgical cases where it is desired to rid patient of hookworm the drug should be given several days before the use of an anæsthetic.—C. N. Leach and co-workers, per Jl. Trop. Med., Feb. 15/23,47.

Given in Travancore, to several thousand coolies every month—the dose being 2 minims for each year of age, with a maximum of 45 minims, floated on 2 ounces of water; no complaints.—J. H. Moore, Travancore, Feb., 1925.

PREGNANCY not a contraindication where *Necator americanus* is the offending agent.—Jl. A.M.A. i./26,736.

Follow with a saline purge. Unsuited for weak individuals and those with liver derangement. Fats and Alcohol should be avoided and a diet rich in carbohydrates and poor in fats is indicated. Can be given in kala-azar and malaria during remissions of fever, and is safe for pregnant women. Superior to Chenopodium for Necators and on a par in removing Ankylostomes. With Chenopodium has a distinct ascaricidal action and orally has more action on Oxyuris than any other anthelmintic. Promising also by rectal injection. in warm milk. Little action against Trichuris, Strongyloides, or tapeworms—A. C. Chandler and A. K. Mukerji, I.M.G., Feb., '25,68.

Good results in Egypt.—Per Jl. Trop. Med., July 15/25,268.

The **addition of Chenopodium** of no value in pure Necator infections, but the ***combination is more powerful on Ankylostomes than either drug alone.*** A dosage of 60 m. of Carbon Tetrachloride in milk and 15 m. Oil of Chenopodium in a capsule is safe for controlled patients. —A. C. Chandler and A. K. Mukerji, I.M.G., April, '25,147. Combined almost ideal.—L. i./30,27.

More than 225,000 persons treated in Siam since May, 1923, with a mixture of Chenopodium (40%) and Carbon Tetrachloride (60%). Maximum dose 2 Cc. Three deaths reported.—Jl. Am. Pub. Health, per Jl. A.M.A. ii./25,1001.

A dose of 3 to 4 Cc. for an adult of Carbon Tetrachloride is ***as safe or safer than any other anthelmintic,*** provided it is accompanied or followed by a saline purge, patient is well nourished and has normal liver, has adequate amount of Calcium in his diet, refrains from use of Alcohol before and after treatment, is given diet rich in carbohydrates and poor in fats, and is not starved preliminary to treatment, the drug being given about 3 hours after a moderately light carbohydrate and protein meal. Heavy ascaris infection a contraindication unless the drug is given in combination with Oil of Chenopodium. A single dose of 3 to 4 Cc. is safer than a smaller amount given in divided doses.—R. N. Chopra and A. C. Chandler, 'Anthelmintics and Their Uses' (Balliere, Tindall and Cox, 1928).

60,000 hookworm patients received treatment at the Old Cairo Hospital (C.M.S.) during 8 years. Writing October, 1928, the treatment most favoured was Carbon Tetrachloride and Chenopodium Oil, or Thymol with Magnesium Sulphate intervening—course spread over 12 days.—Miss C. C. Byrde, B.C.P., Oct., 1928.

A mixture of Carbon Tetrachloride 2 and Chenopodium Oil 1, given to children, 0·1 Cc. for every year of age up to a maximum of 1·5 Cc.—Col. Med. Report, No. 207, p. 33, per Jl. Trop. Med., May 2/27.

Criticisms.—Carbon Tetrachloride ***does not occupy the position claimed. Thymol and Chenopodium Oil,*** 4 Gm. nd 1·2 Cc. respectively, are safe, the latter being more effective against . *duodenale.* After expulsion of the worms Arsenic may aid the bone marrow formation of hæmoglobin. A drug specific in its toxicity to hookworms as yet to be found.—Lt.-Col. C. Lane, L. ii./26,346.

Deaths after Carbon Tetrachloride have occurred in Jamaica, and ***Thymol*** now the drug of choice against hookworms.—B. M. Wilson, B.M.A. Ann. eeting, B.M.J. ii./28,207. Carbon Tetrachloride a proved potent liver oison and should not be given to a purged and fasting patient unless sufficient lucose is given at the same time.—H. M. Hanschell, *ibid.* Of value by the outh and intravenously in human schistosomiasis and in distoma infestation cattle.—F. G. Cawston, *ibid.* Usual single dose 2·5 to 3 Cc.—F. G. Cawston, rans. Roy. Soc. Med., Nov. 25/28, p. 245.

Tetrachlorethylene and Carvacrol (*q.v.*) have been tried in hookworm nd the former in liver fluke.—P.J. i./31,29.

DISTOMIASIS OF SHEEP.—Carbon Tetrachloride 1 Cc. in capsule, without evious starvation is generally sufficient to clear adult flukes from the bile icts. Some flocks tolerate the drug badly and it is best to ***try it on a ew sheep first.***—L. ii./27,128. From *personal* knowledge this dose harmful and not efficacious: on the other hand a much smaller dose—*e.g.*, 3 Cc. combined with 0·3 Gm. crude Filicin in 0·4 Cc. Vegetable Oil is certainly ective.—W. H. M., March, 1928.

Carbon Tetrachloride poisoning.—Much has been written on is subject, see Edn. XIX., p. 275. Carbon Bisulphide has been suspected as isonous impurity.

Antidote for Carbon Tetrachloride. Magnesium Sulphate the best.—G. Cawston, Pr., Apl. '31.

Fractionation and rejection of the first 1% desirable.—M. Khalil, L. i./26,547.

Should not contain more than ***5 parts per million of Carbon isulphide,*** should be free from acidity, chlorides, free chlorine, organic itter and aldehydes.—M. Perkins, P.J. ii./24,101. *See also* H. H Dale.—es., Sept., '24,323.

sorption and Excretion of Carbon Tetrachloride.

The livers of dogs receiving 3 Cc. by the mouth were badly damaged. Since e danger is greatest during the first few minutes after reaching the duodenum, ***ve a saline purge immediately.***—H. S. Wells, Jl. Pharm. and p. Ther., '25,235.

Poisoning due to production of hypoglycæmia. Relieved by intravenous lcium Therapy.—A. S. Minot, Jl. Pharm. & Exp. Therap., Oct. '31,312.

Schistosomiasis.—Carbon Tetrachloride is not contraindicated even ring a course of treatment with Antimony, though both drugs are liable produce hepatitis or to aggravate this condition where it already exists in istosomiasis. May be given alone, or, with intravenous Antimony, adds the effectiveness of Antimony therapy. The parasites may show very id signs of destruction after one or more doses, but those not completely ed are still confined to the blood-stream and soon recover.—F. G. Cawston, ans. Roy. Soc. Trop. Med., Vol. XXII., No. 3, Nov., '28,247; Jl. Trop. d., Feb. 16/31.

Dry Cleaning.—Being non-inflammable, the solvent is useful. When added Benzine for safety it should constitute at least 70% of the mixture. For ve cleaning it leaves the leather less likely to crack.

Certain oleo-resins may be made by Carbon Tetrachloride extraction, but nas no great advantage except non-inflammability. It is not suited for aloidal drugs. It gives colour reactions with the *o-* and *m-* but not the *p-* stituted phenols.—G. E. Trease and H. Tingey, P.J. ii./26,150.

Iodised Carbon Tetrachloride.—Two cases of lupus erythematosus and one uberculous lupus treated by local use of Carbon Tetrachloride and the same ised (3% is mentioned). Applied on cotton wool alternately, and in lition Iodine internally. Fistulas were washed out with 1 to 5 Cc. of the parations. In a case with great œdema 1 to 2 Cc. of the Iodised preparation injected under the skin.—Goubeau, Cong. Derm. and Syph. Strasbourg, 3.

CASCARA SAGRADA.

(*B.P.* '14). U.S., P.G. V., P. Ital. V., F.E. VIII., P. Belg. IV.

Syn.—Sacred Bark.

The dried bark of *Rhamnus purshiana* (*Rhamnaceæ*).

Dose.—3 to 15 grains (**0·2 to 1 Gm.**) in cachets.

The active constituents of Cascara cannot be defined. In Vol. II. we provide some data. *B.P.* '14 and **U.S. X.** require the bark to be kept one year. The tree grows extensively in British Columbia.

For notes on cultivation and substitution, see Vol. II.

P. Ital. V. requires the bark to yield not less than 24% extractive and not more than 6% ash.

Flavoring.—See Extractum Cascara Liquidum.

Uses.—Increases peristalsis, empties rectum; it is useful for internal piles, and is a good laxative. For dosage see Liquid Extract.

Cascara Capsules (**'mild'**) represent 30 minims of Liquid, or about 6 grains of Solid Extract. Capsules (**'strong'**) are **double strength.** *Dose.*—1, 2, or more. The mild are also prepared with **Euonymin** 1 grain. *Dose.*—1 or 2 at bedtime.

Cascara Jelly.

Dose.—1 to 4 drachms, equivalent to Cascara Extract ½ to 2 grains. For habitual constipation. The agar-agar basis renders the fæces more voluminous and hydrous. It is agreeably flavoured.

Cascagar.—*Martindale.*

Dose.—1 teaspoonful up to 2 tablespoonsful to be taken with stewed apple or other moist food.

A preparation of flaked Agar with Cascara Extract flavored with Lemon, also with Raspberry, acting similarly to the preceding.

Syrupus Cascara Aromaticus (*B.P.* '14). *Syn.* **Elixir of Cascara B.P.C., 1894.** Contains 40% of Liquid Extract of Cascara flavoured with Orange and Cinnamon.

Dose.—½ to 2 drachms (**2 to 8 Cc.**) as laxative.

Extractum Cascara Sagrada Siccum (*B.P.* '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**) in pill.—An aqueous extract (*Cascara Sagrada* is indeclinable, being Spanish and not Latin).

U.S. X. 1=3 by extraction with boiling water, and adjusting with starch. Fr. Cx. and P. Ital. V. extract with 60% alcohol.

Extractum Cascara Sagrada Liquidum (*B.P.* '14).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

An aqueous extract containing 25% of alcohol (90%). It may be made miscible with water by adding half its volume of sal volatile.

110 minims on evaporation on a water bath for 4 hours should yield not less than 20 grains of residue.

P. Ital. V. is similar. **P. Belg. IV.** uses 60% Alcohol. **P. Jap.** makes with Alcohol 90% and Water equal parts. **Fr. Cx.** Nouv. Supp. 1926, with Alcohol 50% 1=1 by weight using 8% of Light Calcined Magnesia in the extraction. **Fluidextract U.S. X.** 1=1 by percolation with hot water, evaporating and adding 25% of alcohol (95% vol.). *cf.* **Glycetracts.**

Use in Constipation.—
It is best to take advantage of its tonic properties and avoid its purgative tion. The initial dose depends on the individual, but it must be correctly und—15 to 20 drops *t.d.*, suffices for the adult. The object is to procure one otion only a day. The dose that is sufficient must be taken in a wineglassful water thrice daily after meals for a week or ten days, or until the action comes somewhat too pronounced. Then reduce dose by one drop only nd take with same regularity as before. In time it will be found that 1 drop water thrice daily after meals will be sufficient. Finally the medicine may omitted altogether.

Constipation in a child will often be relieved by one to three drops in a rachm of syrup one to three times a day.—Gordon Sharp.

After laparotomy, suitable aperients are Confection of Senna or the following : xt. Cascara Sagrada Liq. 1 ounce, Sodium Sulphate 1 ounce, Solution of mmonia 40 minims, Chloroform Water to 8 ounces. *Dose.*—2—4 drachms ght and morning.—C. W. Gordon Bryan, L. ii./30.1141.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Extractum Glycyrrzæ Liquidum, *v.* also Syrupus Cascara Aromaticus.

Orange, Coriander, Anise, Cassia and Liquorice all mask the unpleasant taste of Cascara.

Bitter-free Cascara '—*Martindale.*

Dose.—¼ to ½ drachm increased.

A preparation to supply the tonic laxative properties of the bark hile omitting the griping substances. It is not made by means of agnesia.

Fluidextractum Cascaræ Sagradæ Aromaticum, U.S. X.—*Average dose.* 30 minims (2 Cc.) 1=1. Made by percolating the drug mixed with magnesia d slaked lime with boiling water, evaporating and adding several flavouring ents. Sometimes called ' Aromatic Cascara ' in the States.

P. Ital. V. has also an Aromatic Liquid Extract employing Magnesia, th Licorice, Glycerin, Saccharin and Anise.

xtractum Cascara Aromaticum Liquidum.—*Cowley.*

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Cascara Sagrada (No. 20 powder), 20 ounces, Diluted Sulphuric Acid, ounce, Alcohol (90%), 4 ounces, Oil of Coriander and Oil of Orange, of each minims, Spirit of Chloroform, 80 minims, Gluside (soluble), 13 grains, quid Extract of Liquorice, 4 ounces, Solution of Ammonia and Distilled ater, *aa. a.s.* to 20. For details of procedure, see Edn. XIX., p. 278.

Kasak (T.M. 67927, 67928, 90413).—*Dose* for children, 1 or 2 drachms ; adults, ½ ounce. A laxative free from bitterness.

asena.—*Dose* as last, is the same with Senna. **Kasena Capsules** are also made.

istura Cascara. Gt. Orm. H.

Liquid Extract of Cascara, Liquid Extract of Liquorice, Syrup of range Peel, Chloroform Water, of each 15 minims for one dose.

Ⓟ**Mistura Cascara Sagrada Compositus,** Vic. Park.

Dose.—½ to 1 ounce.

Liquid Extract of Cascara 1 drachm, Hyoscyamus Tincture ½ drachm, ncture of Nux Vomica 10 minims, Aromatic Spirit of Ammonia 1 drachm, agnesium Sulphate 1 drachm, Syrup of Ginger 1 drachm, Water to 1 ounce.

R.O.H. Liquid Extract of Cascara 20 minims, Liquid Extract of Licorice minims, Tincture of Belladonna 5 minims, Tincture of Nux Vomica 5 minims, l Volatile 20 minims, Chloroform Water to 1 ounce.

istura Hepatica. *Dose.*—1 to 2 drachms in water. Liquid Extract of Cascara 20, Tincture of Jalap 20, Tincture of Podophyllum 10, Compound Tincture of Gentian 10, Chloroform Water 50, Sal Volatile 10.

Pastils of Cascara each contain 2½ grains of Extract, and are coated with Tolu. *Dose.*—1 or 2 taken whole with a little water.

Ⓟ **Pilula Cascara Composita.**

Extract of Cascara 1½, Extract of Nux Vomica, Dry Extract of Belladonna, of each ⅛, Milk Sugar 1. In grains for one pill, or in grammes for fifteen, each pill weighing 3¼ grains.

Dose.—One before dinner or at bed-time.

An agreeable and efficient aperient, with gentle action continuing beyond the first day; good for liver inaction.

Cascara Extract Tablets, plain or sugar coated, 1, 2, 3, 4, and 5 grains. *Dose.*—1 or more according to strength.

Tinctura Cascara Sagrada.

Laxative dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Percolate 1 to 5 with Alcohol 60%.

Ⓟ **Tinctura Laxativa.**

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Liquid Extract of Cascara Sagrada 2, Aromatic Spirit of Ammonia 2, Spirit of Chloroform 2, Tincture of Belladonna 1, Tincture of Nux Vomica 1. This is an agreeable and elegant form of administering Cascara, being miscible with water.

Trochisci Cascara Sagrada et Olei Menthæ Piperitæ.

These are made with fruit basis, contain 2½ grains of Extract flavoured with Peppermint, and are useful correctives. *Dose.*—1 or 2.

Vinum Cascara.—*Martindale.*

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Liquid Extract of Cascara 1, Sugar 1, Aromatic Elixir 1, Sherry to 20. Mix and decant from any sediment which may form on standing.

Dioxyanthraquinone. *Syn.* ✱ISTIZIN (T.M. 338008).

$HO.C_6H_3CO.CO.C_6H_3.OH$=242·0624. P.G. VI.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Orange crystalline powder, slightly soluble in water. M.pt. 190 to 192° C. A synthetic purgative. *Tablets* contain 0·15 Gm.

✱**Isacen** (T.M. 451886). *Syn.* DIACETYL-DIHYDROXYPHENYL-ISATINE.

Dose.—2 to 4 granules, each 1/12 grain (**0·005 Gm.**).

A synthetic purgative, which in small doses stimulates peristalsis by action upon the mucous lining of the colon and large intestine. It passes through the stomach unchanged and has no action upon the kidneys.

CEREVISIÆ FERMENTUM.

Syn. FÆX MEDICINALIS. *Dose.*—½ to 1 ounce (**15 to 30 Gm.**).

The cells and spores of *Saccharomyces Cerevisiæ.*

P.G. VI. requires **Fæx Medicinalis** to be dried at a temperature not exceeding 40° C., and to retain its fermenting properties.

All fermentations produced by living organisms (as in the case of yeast fermentation of sugar) are caused by definite chemical substances—ferments—produced in the cells of the organism. The ferment from the yeast cell was extracted in 1897 by precipitating yeast juice with Acetone, centrifugalising and washing the sediment with Ether and Acetone, and drying over Sulphuric Acid.

Molasses used for growing Yeast.—P.J. i./30,577.

Fæxin. A dry powdered yeast. Pills and tablets are made *v. infra.*
Dose.—A teaspoonful in water, beer, or milk with meals.

Manufacture.
The Acetone method of drying consists in treating the yeast with repeated quantities of Acetone, pressing off and then treating with Ether and finally drying at not exceeding 45° C. Another method is to work in a partial vacuum over Sulphuric Acid at 42° C. (108° F.). Spread the Yeast in very thin layers.

Uses.—Fresh yeast may be useful in indigestion and flatulence. The Vitamin content may assist in developing muscular tissues and the nerves and consequently improve general health. Both fresh yeast and the dried form are given to check boils and for acne. It is said that fresh yeast given *per os* grows actively in the stomach and slightly reduces sugar in diabetes. Yeast has been used for constipation, as also in tuberculous affections and in dysentery. In dyspepsia due to swallowing nasopharyngeal pus, it acts gastrically, and probably by *direct* contact. It not only checks vomiting, but *after* 14 to 21 days' use it will be noted that the patient loses the icteric complexion, and gets a healthy colour.

Some hold the action of Yeast is virtually that of Nuclein, as it is still effective after the yeast has been heated to 130° for an hour.

Glycogen 5% (equivalent to 25% of the dried material) is a constituent of yeast.—Pavy and Bywaters.

For the peripheral neuritis of mediterranean fever, yeast has been recommended in doses of two drachms, twice daily. (*cf.* VITAMINS.)

Fæxin Extract. *Syn.* **Extractum Cerevisiæ Fermenti.**
Made by extracting fresh Yeast. This has been used for the various affections for which fresh and dried Yeast is employed, *e.g.*, in acne, erysipelas, furunculosis, folliculitis, leucorrhœa, diabetes, conjunctivitis, phlyctenulosa, typhoid and acute articular rheumatism.

Fæxin Extract Pills, Stearettes and **Tablets** contain 3 grains (**0·2 Gm.**).

Extractum Fæcis, P.G. VI.
Prepared by first removing the bitter of fresh 'lower' beer Yeast with 1% Sodium Carbonate, and then submitting to a process of auto-digestion in the presence of Hydrochloric Acid, finally extracting the mass with water, evaporating and incorporating 25% of 'Medicinal Yeast' (entire Yeast with bitter removed) to produce the powder. The extract is used as pill excipient.

✱**Barmsule** (T.M. 521176).
A proprietary (Patent 18426/31 applied for) containing live Yeast cells in Capsule form. *Dose.*—2 to 4 twice or thrice daily.
Advocated in anæmia, boils, constipation, eczema, headaches, indigestion, insomnia, nervous disorders, rheumatism, sciatica, etc. Live Yeast, by regulating the process of digestion may improve assimilation. The Vitamins present are also brought into effect, as also the stimulation of the white blood corpuscles.

✱**Marmite** (T.M. 249997, 321670, 404589, 430172, 510094, Cl. 2), a palatable yeast extract, is rich in Vitamin B. It is stated to promote growth in weakly children, assimilation of fat, produces leucocytosis in chronic septic conditions and increases general metabolism.

Vitamins are absent from meat extract. Apart from this fact, there is no available information to show that meat extract is better or *vice versa.*—A. Chapman, P.J. i./19,115.
The preparation of Yeast Extract.—P.J. ii./27,482.

PERNICIOUS ANÆMIA OF PREGNANCY treated with Marmite and with Liver Extract. Both preparations are active even when complicated by malaria or hookworm. Marmite thought equal to Liver. Suggests that macrocytic anæmia is a deficiency disease.—Lucy Wills, B.M.J. i./31,1059.

Irving's Hefe-Vitamin Tabletten, according to investigation of C. A. Rojahn, contain Yeast 31%, Water 6.65%, Sodium Bicarbonate 25·2%, Ammonium Bromide 8·9%, Phenolphthalein 4·4%, Pyramidon 15·5%, Excipients 8·2%. The Yeast was non-fermenting.—Gehe.

***Yeast Vite** is T.M. 461971.

Nuclein.

Dose.—15 grains (**1 Gm.**) several times daily.

Tablets, 1 grain (**0·06 Gm.**).

Is considered to be a compound of Nucleinic Acid with Albuminates and Carbohydrates. It tends to stimulate formation of white blood corpuscles, and hence to act as a bactericide. Septicæmia has been treated with it. The following is generally used :—

Acidum Nucleinicum. *Syn.* NUCLEIC ACID.

White powder somewhat soluble in water in the presence of a sufficiency of Sodium Hydroxide or Potassium Acetate. Its solution is acid to litmus paper. Insoluble in Alcohol.

J. J. Blackie, in a note on Pharmaceutical nomenclature, supports our divisions of these compounds.—P.J. ii/21,543.

Commercial Nucleic Acid should contain not much less than 15% Nitrogen and 9% organic Phosphorus on the dry material.—A. C. Chapman, Analyst, 1918, 43, 259 ; see also Y.B.P., 1919, 148.

F.E. VIII. gives 10-11% Phosphorus in organic combination.

Dose.—15 minims (**1 Cc.**) of a solution made with Alkali *q.s.*, *v. infra,* hypodermically. **Sterules, Hypodermic,** contain ¾ grain in 15 minims (**0·05 Gm. in 1 Cc.**). Much larger amounts have however been given, *vide infra. Per os* ½ to 2 grains.

When ***NUCLEINIC ACID*** *is* ***ordered for injection,*** *give the equivalent in the form of* **Sodium Nucleinate,** *the Sodium Nucleinate being prepared from Nucleinic Acid and a sufficiency of Sodium Carbonate to make it neutral to litmus. The writer is in the habit of employing a 5% Sodium Nucleinate solution when a saturated solution of Nucleinic Acid is ordered for injection. Sodium Nucleinate solutions should be prepared with Normal Saline and a sufficiency of Phenol for preservative purposes.*

Uses.—In treatment of anæmia, scarlet fever and puerperal fever, also in tuberculosis. To increase leucocytosis, and also the resistance of the patient in typhoid.

Sodium Nucleinate Solution 2 Cc. containing 0·05 Gm. per Cc. intramuscularly increases leucocyte count; found of value in influenza.—J. Graham Willmore & F. M. Gardner-Medwin, L. i./22,116. See also Gardner-Medwin, B.M.J., July 12, 1924, and P. S. Hichens and R. E. Gibson. Apparently saved life in a case of imminent pneumonia. 2 Cc. given every 4 hours. Should be tried in puerperal fever and other bacterial infections.—B.M.J. i./28,52.

LOBAR PNEUMONIA.—Sodium Nucleinate, 0·1 Gm. intramuscularly, of value. It brings down the temperature within 48 hours—otherwise the dose is repeated. Sodium Bicarbonate also given by mouth in ½ drachm doses every 4 hours in severe cases when the urine contains Acetone.—B.M.J.E. i./27,64.

In lobar pneumonia of an asthenic type in which leucocytes do not rise in number as the disease advances.—J. D. Comrie, Pres., Nov., '27,390.

Pneumonia treated.—H. J. Clutterbuck, B.M.J. i./31,830.

Septicæmia, where operation is requisite, treated by *B. Coli* 50 millions

and *Streptococcus* 10 million 10 days, and again 3 days before operation and on the night preceding operation, 5 Cc. of 5% Sodium Nucleinate intramuscularly.—D. P. D. Wilkie, B.M.J. ii./31,595.

Sodium Cacodylate with Nucleinic Acid in Septicæmia, see p. 182.

Progressive paralysis treated by Sodium Nucleinate on the basis that leucocytosis should be the aim.—O. Fischer, L. ii./22,537.

Bismuthi Nucleinas. *Dose.*—20 (**1·2 Gm.**) to 40 grains (**2·5 Gm.**). Yellowish powder containing 50% Bi. Insoluble in water and in dilute acids, splits up in the intestines, hence used as astringent for chronic intestinal catarrh. Was used on children under 2 years of age, also in cases of tuberculous diarrhœa, with benefit.

***Nargol** (T.M. 228097), **Mercurol** and **Cuprol** are compounds of Nucleinic Acid with respectively Silver, Mercury and Copper. Cuprol and Nargol are of use in granular ophthalmia in the form of 5% instillations. Nargol is soluble in water 1 in 4. Contains about 10% Ag.

Nargentol is stated to be a silver nucleinate.

Glutathione.

A tripeptide containing Glutamic Acid, Cystine, and Glycine, corresponding to $C_{10}H_{17}N_3SO_6$. M.pt. 190° (with decomposition).

The tissues of rat sarcoma, carcinoma and human mammary carcinoma contain abnormally small amounts of reduced Glutathione. Glutathione promotes the oxidation of certain unsaturated fatty acids and Lecithin. Glutathione was first isolated by Sir Gowland Hopkins in 1921. (The author prepared a small quantity for experimental purposes from yeast (1930), using the method of Sir Gowland Hopkins.)—Jl. Biol. Chem., Oct., '29,269.

Relation of Glutathione to Arsenicals.—No relationship established between reduced Glutathione and susceptibility of animals to Arsenical intoxication. The therapeutic effect of Thiosulphates in Arsphenamine dermatitis must depend on some property other than effect on the Sulphydril content of the skin.—H. Brown and J. A. Kolmer, Jl. Ph. & Exp. Therap., '29,417.

℗ **CHLORAL HYDRAS** (*B.P.* '14). U.S. X, P.G. VI., Ph. Ned V., P. Jap., P. Helv., P. Ital. V., P. Belg. IV., F.E. VIII., $C.Cl_3.CH.(OH)_2$=165·3944. Trichlorethylidene Glycol.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, or in chloroform water well diluted. Fr. Cx. has *maximum single dose* 60 grains, during 24 hours, 180 grains approximately.

Manufacture.—By the action of dry Chlorine upon Alcohol. It has M. pt. 49—53° C.

Soluble 4 in 1 of water, 5 in 1 of alcohol, 2 in 1 glycerin, 2 in 1 of ether, and 1 in 3 of chloroform, likewise soluble in oils and fats.

Flavoring.—Glyl Rosæ, Glyl or Syl Amygdalæ Amaræ; Syrupus Aurantii Floris.

Antidotes to Chloral.—Keep patient awake, apply strong ammonia to nostrils. Stomach pump or emetics (zinc sulphate 20 grains), followed by amyl nitrite, coffee, electricity, oxygen, picrotoxin, or strychnine. For Antidotes to ***Chloral*** when in ***conjunction*** with ***Morphine,*** see **Antidotes to Poisons.**

It is useful as an antidote to poisoning by strychnine.

Incompatible with alkalis, ammonium salts, potassium iodide

or permanganate, and with bromides in presence of alcohol—chloral-alcoholate may separate; also, with Magnesia, Chloroform and Magnesium formate may be produced; and with Sodium Barbiturate. —P.J. i./31,503. Liquefies with camphor, *q.v.*

Uses.—As a hypnotic, it is often combined with opiates, morphine or bromides, but it is incompatible with quinine. Its use is contra-indicated in heart affections, Bright's disease, and when the vital force is very weak. Its sedative action resembles that of chloroform.

In ASTHMA Chloral Hydrate 30—40 grains is often useful.—Yeo.

CHOREA has been treated by inducing prolonged sleep with its aid. It is given in tetanus. In epilepsy small doses may be efficacious.

In PUERPERAL ECLAMPSIA—control of fits by Chloral and Morphine regarded in France as almost specific.—For details see Edn. XIX., p. 282 or B.M.J. i./12,1128.

SEA-SICKNESS has been treated with drachm doses of a mixture of 2 drachms of Syrup of Chloral with 30 grains ammonium bromide, in water 1½ ounces.

INFLUENZA has been treated with 2% solution as gargle.

Ⓟ **Chloral Camphoratum,** B.P.C. (Pigmentum Chloral et Camphoræ, T.H.).

Chloral Hydrate 1, Flowers of Camphor 1. Sp. Gr. 1·223.

Combine in a warm mortar. It remains liquid at ordinary temperatures, and forms a valuable application painted on painful parts in neuralgia and rheumatism. It mixes freely in alcohol, ether, oils and fats, but the camphor is precipitated on adding to water or glycerin. Cocaine 10% or less may be incorporated.

The compound (chloral and camphor) dissolves the alkaloids atropine, morphine, and veratrine to the extent of 1 in 30 or more, but their salts are less soluble in it. Liquefactions of a similar kind take place on mixing and gently heating respectively chloral hydrate 1 with menthol 1, or phenol 3, or thymol 1. Quinine salts and chloral hydrate also form liquid combinations.

In FIBROSITIS the mixture of chloral hydrate, camphor and menthol is found to be satisfactory. Painted over the part, then gently rubbed in with the fingers.—A. P. Luff.

Ⓟ **Pigmentum Chloral Compositum.**—W. H. has Chloral Hydrate 1, Menthol 1, Thymol 1, Camphor 3. L.H. consists of equal parts of Chloral Hydrate, Mentho l and Camphor. Cautiously used it is good for minor cases of flexural prurigo—one or two drops rubbed into the spots at bed-time.—W. J. O'Donovan, B.M.J. ii./30,957.

Ⓟ **Linimentum Chloral Compositum.**—R.D.H. is the same.

Ⓟ **Chloral Tannin Solution.**—*Syn.* CAPTOL.

Chloral Hydrate 1, Tannin 1, melt together on water-bath and dissolve in water, *q.s.* to produce 8. For strengthening the hair.

Ⓟ **Lotio Crinalis R.N.H.**

Chloral Hydrate 10 grains, Salicylic Acid 10 grains, Mercuric Chloride ¼ grain, Glycerin 20 minims, Acetone ½ ounce, Isopropyl Alcohol to 1 ounce.

Ⓟ **Liquor Bromo-Chloral Compositus.** B.P.C., 1901.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). 1 drachm contains nearly 10 grains each of Chloral Hydrate and Potassium Bromide.

Choral Hydrate 1,600 grains, Tincture of Indian Hemp 400 minims, Tincture of Fresh Orange Peel 400 minims, Henbane Juice 1,600 minims, Syrup 3¾ ounces, Liquid Extract of Liquorice ½ ounce. Dissolve, add Potassium Bromide 1,600 grains dissolved in Distilled Water 7 ounces. Filter and add Distilled Water to 20 ounces.

Resembles Ⓟ ***Bromidia** (T.M. 45813), which is stated to contain in each drachm Chloral Hydrate 15 grains, Potassium Bromide 15 grains, Extracts of Cannabis and of Hyoscyamus $\frac{1}{5}$ grain each.

Dose.—$\frac{1}{2}$ to 1 drachm in syrup or water.

Ⓟ **Enema Chloral, L.H.** Chloral hydrate 10 to 40 grains, starch enema to 4 ounces.

Ⓟ **Suppository of Chloral.**

Chloral Hydrate 5, Oil of Theobroma 10. In grains, for one suppository, in grammes, for fifteen. Press into moulds. Heat must not be applied. It is useful in infantile convulsions. It is locally irritating.

Ⓟ **Syrupus Chloral** (*B.P.* '14). *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**). Chloral Hydrate and Water *a.a.* 20% in Syrup.

Ⓟ **Tablets of Chloral,** 5 and 10 grains (**0·3 and 0·6 Gm.**) to *be dissolved—not swallowed whole, might blister. Dose.*—**1 or more.**

Chloralamide. *Syn.* **Chloral Formamidum** (*B.P.* '14).

$CCl_3CH(OH)NH.COH = 192{\cdot}4102$.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in weak spirituous or acidulated solution. *Max. single dose* 4 Gm. Max. in 24 hours 8 Gm.

PATENT: 7391/1899 ***Expired.*** TRADE MARK: A *device* with name and address, T.M. 95188, is still on the Register.

In colourless, inodorous, shining crystals with a faintly bitter taste. Soluble about 1 in 20 of water, 1 in 2 of alcohol. Must not be heated over 55° C. M. Pt. 114–115° C. Incompatible with alkalis.

Manufacture.—By combining anhydrous Chloral 147 with Formamide 45 and recrystallising from Alcohol about 70%—care being taken, as above mentioned, not to heat above 55° C.

The toxicity of a brand of Choralamide made by the author, August, 1916, was found to be less than that of Chloral Hydrate and not greater than that of the Chloral which it would yield on hydrolysis. The details showed that up to 70 mgr. per 100 Gm. of frog were tolerated in the case of Chloral Hydrate, while up to 100 mgr. were tolerated in the case of Chloralamide.

Uses.—Hypnotic in insomnia of alcoholism, neuralgia, hysteria, cardiac diseases and sea-sickness, Chloralamide and Potassium Bromide of each 15 grains, with Orange Tincture and Chloroform Water recommended. It acts if given as an enema.—*Hale White.*

Elixir Chloralamidi. *Dose.*—1 ounce (**30 Cc.**)=30 grains (**2 Gm.**) Chloralamide 2 Gm., Alcohol 5 Cc., Aromatic Syrup 5·4 Cc., Glycerin 15 Cc., Water *q.s.* to 30 Cc.

Haustus Chloralamidi, G.H.

Chloralamide 30 grains, Mucilage of Tragacanth 1 drachm, Chloroform water to 1 ounce.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—3 or more.

Chlorobrom. *Dose.*—$\frac{1}{2}$ to 1 ounce. A specialty said to contain 30 grains each of chloralamide and potassium bromide in an ounce, flavoured with liquorice, for insomnia and sea-sickness.

Haustus Chloralamidi Compositus, N.H.I.

Chloralamide, Potassium Bromide, of each 15 grains, Spirit of Chloroform 20 minims and Water to 1 ounce.

Ⓟ **CHLOROFORMUM** (*B.P.* '14). P.G. VI., U.S. X, P. Jap., P. Helv., Fr. Cx., Ph. Ned. V., P. Ital. V. $CHCl_3$=119·3788.

Ⓟ*Chloroform and all preparations or admixtures containing more than 20% of Chloroform.*

Syn. Trichloro-methane; Formyl Terchloride.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), in mucilage and water or in a perle; 3 drops=1 minim. Small doses may be given as chloroform water or spirit of chloroform. Very large amounts (up to 2 ounces) have been taken internally without causing death.

For History and Testing of, and further information on Chloroform see Vol. II.

A little caustic lime added to a bottleful will neutralise any acid products that may form in it.

Pink Chloroform and **Green Ether** suggested to prevent accidents.—B.M.J. ii./14,241.

Ⓟ**Acetone Chloroform** specially prepared for anæsthesia. Should be kept in amber-coloured, stoppered bottles or in the dark.

Chloroform has Sp. Gr. 1·490 to 1·495 at 15·5° C. Boils at 60°—62° C. Miscible in all proportions with Alcohol, Ether and Oils. It may (*B.P.* '14) be made from Alcohol, Industrial Methylated Spirit or Acetone Sp. Gr. 1·483 to 1·487, and contains 2% Alcohol.

Uses.—Inhaled, it is anæsthetic and analgesic. Internally it is antispasmodic and sedative for asthma, colic, cough, and neuralgia.

In sea-sickness, one or two drops of Chloroform on a lump of sugar or in a wineglass of iced soda water, repeated every fifteen minutes often give relief.

Externally in liniments to promote absorption and allay pain, as in neuralgia and sciatica. *See* General Preparations of Chloroform. 1 in 500 is a preservative of Infusions and Animal Extracts. It is a useful deodorant, *e.g.*, for the hands after post-mortem work.

Infection by intestinal parasites, *e.g.*, *Ankylostoma*, *Ascarides* and *Oxiurides* are well treated by doses *per os* of 3 to 4 Gm. mixed with Castor Oil or Olive Oil. It is a panacea also against all forms of external parasitic infection—*e.g.*, a 20 to 30% Chloroform in a fatty ointment base.—G. Alessandrini, L. ii./15,346.

Anæsthetic Uses and Preparations of Chloroform.

Chloroform is a liver poison. If **Glucose** is given a few hours before it is well tolerated.

The **Vernon Harcourt Regulator** permits of accurate dosimetry by the anæsthetist. The temperature of the Chloroform is adjusted to 16–18° C. and an admixture of Chloroform vapour 0·2% with air is used to begin with, afterwards increasing the Chloroform every half minute by 0·2% to a maximum of 2%. Narcosis is maintained by 0·5 to 1%.

See also "Anæsthetics" by Dudley Buxton (H. K. Lewis).

Shipway's Apparatus (L. i./16,70). The most satisfactory way of giving Chloroform or Ether. Warmed mixture of air and anæsthetic vapour in operations for abdominal wounds in war. Patient recovers consciousness quickly and vomiting is rare.—C. Wallace and G. Marshall, L. i./17,640.

Administration of Chloroform either alone or with A.C.E. or Ether on the open Mask.

The following is "a rough sketch" of the usual procedure:—

"The patient who has been breathing steadily and counting aloud, begins to waver and make errors, and then passes into complete anæsthesia. The pulse slows down, and becomes regular, the respirations become regular and blowing, the flaccid cheeks being puffed out with each respiratory effort; the whole muscular system becomes limp, and the pupils become moderately contracted and fixed. The chin must be maintained pulled up; respirations must always be audible, even loud; pulse must be frequently taken and pupils watched." These are the three indicators.

Pulse.—Pulse greatly accelerated generally means that the patient is coming out and is liable to be sick shortly. If pupils or conjunctival reflex confirm this, push the anæsthetic. Pulse becoming weak, irregular or slower, indicates a state of faintness,—remove mask. ***If collapse supervenes*** commence stimulatory measures,—the head to be lowered and body tilted up. Ether and Strychnine hypodermically; gag to be inserted. See that the pharynx is free from mucus by pulling tongue forward. Rectal injection of Brandy, cold water to face and ears; hot cloths over pericardium and (to the adult) artificial respiration. In the case of an infant or child the operator doubles a fist into the child's epigastrium to prevent distension of the stomach, covers child's mouth with a layer or two of gauze, and placing his mouth over the child's, blows the lungs up. The air is then expressed from the lungs and the procedure repeated several times.

Pupils.—"Pin point" pupils may either mean profound anæsthesia, in which case remove mask, or patient is coming out.

When the pupil becomes dilated remove mask, draw both upper eyelids back rapidly and simultaneously. If patient is coming round, response will be obtained,—push the anæsthetic. If no response, patient is in a state of collapse and requires stimulation.

Respiration.—Should the respiration tend to become too quiet, correct by closing one of the nostrils with the finger. Keep lower jaw pushed forward and pharynx clear of mucus, also see that the tongue is well forward. The loop handle of a sponge holder is useful to bring tongue forward in the case of children. Vaseline should be smeared over the parts most likely to come in contact with the mask, thus preventing burning the patient's skin with the overflowing anæsthetic.

Combined Use of Chloroform and Oxygen.—This is conducted by passing the Oxygen through a wash-bottle containing the anæsthetic. The quantity of the Chloroform or Ether is, however, relatively small in comparison with the Oxygen passed through. Alternatively a funnel-shaped leather inhaler containing a piece of spongiopiline or felt is used. In the upper surface of the leather inhaler is a small metal tube for connecting with the Oxygen supply, thus a definite quantity of anæsthetic is given and the amount of Oxygen can be varied as desired.

Crile's Nasal Tube method of giving Chloroform (with a little Oxygen), preceded by Morphine and Atropine.—L. ii./09,364.

Antidotes for treatment if dangerous symptoms arise during inhalation of chloroform. (For Antidotes to ***chloroform swallowed*** *see* **Antidotes to Poisons.**) See that the airway is clear and the clothing loose. Place patient upon the floor with legs held up so that the abdomen is higher than the brain. Artificial respiration by tongue traction (*Pull out the tongue*) and Sylvester's or Schafer's method.

Amyl Nitrite to the nostrils and inject hypodermically 1 drachm of ether or brandy or $\frac{1}{30}$ grain of **strychnine** or 1 Cc. of **Curschmann's Solution.** Hot flannels should be placed over the heart.

Caffeine hypodermically or **Brandy** per rectum.

Inversion of the body has frequently saved patient.

Fibrillation of the heart can be remedied by **Atropine** subcutaneously.

Sodium Lactate Solution. Copious rectal injection has been recommended to restore alkalinity of the blood—assuming Acetone and Diacetic Acid are products of the effects.

Heart massage in Chloroform Syncope by the subdiaphragmatic route often induces recovery.

Glucose *per os* if no vomiting, otherwise subcutaneously or intravenously.

If $\frac{1}{4}$ grain of morphine be first injected hypodermically, less Chloroform is needed, the insensibility is more profound, and the danger attending its use is lessened.

Tne previous administration of Quinidine protects against Adrenalin Chloroform syncope and against the danger of heart failure under anæsthesia.—J. Pharm. Chim., '27,190, per P.J. ii./27,591.

The ***Dangerous Effects of*** Chloroform fall into four groups (1) depression of the respiratory centre (2) fall in blood pressure (3) late toxic effects (4) Chloroform syncope. The use of Chloroform is not justifiable (1) in cases of grave debility with low blood pressure, especially in cases of patients suffering from shock (2) in cases likely to develop acidosis, *e.g.*, the diabetic, the sufferer from septic abdomen, and children (3) in a great many cases during the induction period. To continue to administer Chloroform to an excited and struggling patient cannot be made a safe proceeding and is unnecessary and unjustifiable.—A. Mills, L. i./26,1134-36.

Sodium Bicarbonate dissolved in hot water is given to neutralise acid, and dissolve mucus and dilute the irritant in the stomach.

Hot fomentations or poultices are efficient counter-irritants for the epigastrium. A dilute **Hydrocyanic acid, Bismuth and Soda Mixture** acts well, and in some cases with a foul tongue, powders of Rhubarb, Bismuth and Soda are useful. Morphine increases the sickness, but gives rest. **Scopolamine and Morphine** is better.

After most abdominal operations flatulence is relieved by *Saline per rectum*—1 pint to 1 quart every four hours—leaving in a rectal tube for an hour or so between times. Rubbing the abdomen adds to the comfort of the patient, but more vigorous treatment may be required, such as Turpentine enemata. If the violent sickness still persists give Castor Oil or Magnesium Sulphate by the mouth. If the bowels do not act in six hours an enema of soap and water is effectual. Enemata of brandy and water and sips of brandy may be needed.

In abdominal operations when the vomit is hæmorrhagic and resembles beef-tea dregs or coffee grounds, carry out the above treatment for flatulence, stimulate the patient, give copious draughts of hot soda solution. A leak of blood into the stomach tends to increase sickness. Wash out the stomach and follow with 5 to 10 minims of Adrenalin Solution in a little water.—J. W. Keay.

Adrenalin must not however be injected into a patient under chloroform.

Small doses of chloroform on a lump of sugar sucked, when desire to vomit comes on, give brilliant results. Confirmed 'Spreeërs' get best result for alcoholic vomiting with small doses of alcohol.

Bibliography of untoward results with chloroform, vide Vol. II.

Eye troubles following anæsthesia. Acute conjunctivitis may be caused by vapour of Chloroform or Ether, and keratitis with subsequent corneal scarring may occur. Instillation of Castor Oil prior to anæsthesia, or irrigation with

Boric Acid lotion afterwards, recommended as preventive measures. Keep lids carefully closed and avoid frequent examination.—J. Blomfield, Brit. Jl. Anæsth., Oct., '25,66, per Pres., April, '26,142.

Alkalosis well treated by Ammonium Chloride per rectum, 3 drachms in 5 or 6 ounces water just before operation, and 10 ounces, 15% Sodium Chloride intravenously as soon as patient is put under anæsthetic.—R. Chalmers, L. ii./26,1267.

Anæsthesia in relation to cardio-vascular affections.—F. W. Price, B.M.J. ii./26,879; J. Blomfield, *ibid.*, 883.

The immediate risk is probably 10 times greater with Chloroform than with Ether.—J. Ross Mackenzie, L. i./27,165.

Infants and children take Chloroform well, but it should not be used in those with anæmia, sepsis or shock.—J. Ross Mackenzie, L. i./27,164.

The effect of Chloroform anæsthesia on blood, kidneys and liver of young children is very slight—with proper supervision, a good anæsthetic for children.—B.M.J.E. i./24,43.

As an anæsthetic in women at the menopause Chloroform should not be used.—J. H. Hannan, B.M.J. ii./27,15.

Carbon Di-oxide as an aid in general anæsthesia.—J. S. Lundy, Jl. A.M.A. ii./25,1953. *See* ***Acid Carbonic.***

Ⓟ**A.C.E.** (Alcohol, Chloroform and Ether).

Absolute Alcohol 1, Chloroform 2, Purified Ether 3. Sp. Gr. about 1·002. The three ingredients are intended to evaporate uniformly.

A.C.E. is as effective as pure Chloroform, and is safer for deep and prolonged anæsthesia, while it is sufficiently rapid in operation to be convenient for general use, although it takes longer than Chloroform (10 to 15 minutes) to procure anæsthesia. It is of service in midwifery.

Ⓟ**C.E.**, *i.e.*, a mixture of chloroform 2 parts with ether 3 parts, is an even better anæsthetic mixture in some cases, where the airway is encroached upon.

This mixture in same proportions, using a Skinner's mask, employed in a variety of grave operations—panhysterectomies, removal of double pyosalpinx, difficult appendicectomies, excisions of rectum, etc. Time of induction of anæsthesia averaged about 8 minutes. Modifications of the proportions have been suggested from time to time.

Chloroform and Ether anæsthesia produces immediate and marked lowering of the blood *p*H, leading to a condition of uncompensated alkali deficit which may go on to profound acidosis (coma). Ether and Chloroform produce a decided hyperglycæmia during anæsthesia, and deep and prolonged anæsthesia by these agents readily leads to oliguria or anuria. Gas anæsthetics not subject to these disadvantages, but they increase hæmorrhage, especially oozing from raw surfaces. Ether and Chloroform have inhibiting effect on uterine contractions, while gas anæsthetics increase contractions and afford more definite and controllable pain-relief and oxygenation. Absence of general circulatory depression with gas anæsthetics.—F. H. McMechan, B.M.J. ii./26,1110.

Deaths under anæsthetics. Contra to the common opinion, the Registrar-General's report serves to dispel the idea that Chloroform is safe when diluted with Ether.—A. Goodman Levy, L. i./26,174.

Respiratory complications following operations.—55 cases recorded in 33,000 operations. Anæsthesia induced with Ether in 50%. A mixture of 2 parts Chloroform and 3 parts Ether used in any operation where required—*i.e.*, if Ether not adequate for relaxing.—D. C. Aikenhead (Manitoba), B.M.J. ii./30,515.

Anaesthol. A mixture of Ether and Chloroform with 17% of Ethyl Chloride. Used by Gwathmey in adenoid and tonsil operations. Gas and oxygen are passed over the preparation for inducing anæsthesia, and gas—oxygen—ether for maintaining.—J.A.M.A., N.Y.M.J., June 19/20, p. 1065, per Pres., Feb., '21,36.

Tissues exposed to various concentrations of Ether and Chloroform. There was greater reversibility on low organisms, Yeasts and seeds and *Chlamydomonas*, with Ether than with Chloroform.—A. L. Flemming, B.M.J. ii./22,921.

General Preparations of Chloroform.

Aqua Chloroformi (*B.P.* '14) and P. Jap.—1 in 400 of water. F.E. VIII. and P. Ital. V., 1 by wt. in 200.

Dose.—½ to 2 ounces (**15 to 60 Cc.**).

Salts, like sodium sulphate, are apt to cause deposition of chloroform from aqueous solution.

Ⓟ **Chloroform Sterules** *for Inhalation.*

Encased in cotton wool and silk ; contain 10 minims in each. Are convenient for use in asthma, etc. ; may be fractured and used by the patient while in bed. In angina pectoris Chloroform inhalations —'so far from being unsafe in cardiac disease, are often of the greatest use and perfectly safe.' In croup, brief inhalation of Chloroform acts promptly.—Whitla. Yeo.

Sterules are also made containing 20, 30, and 60 minims—the last for obstetric purposes avoiding risk of overdose.

Ⓟ **Gelatin Capsules of Chloroform.** *Dose.*—One or two.

Contain each 5 minims ; are for similar uses, but the chloroform is apt to volatilise ; PERLES 3 minims. Very useful in sea-sickness.

Ⓟ **Chloroform and Ethyl Iodide Sterules,** *v.* Ethyl Iodide.

Ⓟ **Chloroformum Camphoratum, B.P.C.**

Camphor 2, Chloroform 1.

Useful for toothache, applied on cotton wool.

Ⓟ **Chloroformum Mastiche.**

Mastiche 1, Chloroform *q.s.* to 2.

Ⓟ **Guttæ Chloroformi cum Menthol Compositæ.**—SELF-INFLATOR DROPS. Menthol 15 grains, Chloroform ½ ounce, Acetic Ether and Alcohol 90% of each 2 drachms.—Dundas Grant.

Directions.—2 or 3 drops to be placed upon the wool in the inflator on each occasion of use.

CHRONIC TYMPANIC AND EUSTACHIAN CATARRH.—Value depends to an extent on the ease with which air containing a little chloroform passes up the Eustachian tubes. Inflation with an **Eustachian Self-Inflator** is conducted as follows :—Drop the amount prescribed on the wool in the mouth-piece with a dropper. With the mouth-piece held firmly between or against the lips (according to the form of the instrument) and the nose-piece tightly in the freer of the two nostrils, compress the other nostril to close it completely. Draw a breath (not through the instrument) and then blow through the mouth-piece so as to puff out the cheeks and 'crack the ears.' If vapour is too irritating blow through the instrument a few times before use. To concentrate the effect on the right ear close firmly with the finger the *left* ear and bend head sideways over the left shoulder—*vice versa* for the left ear.

The duration of treatment should be controlled by the prescriber.

For the **Medicated Politzer Apparatus** in which these drops may be used, see Dundas Grant, Pr., June, '25.

Ⓟ **Linimentum Chloroformi** (*B.P.*'14).

Chloroform 1, Liniment of Camphor 1.

Vaseline might with advantage replace the oil of the camphor liniment for this preparation. U.S. orders Chloroform 3, Soap Liniment 7.

℞ ℙ1 **Liquor Chloromorphiæ, Chloromorphia Solution.** (*Miscible.*)

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 150, Glycerin 400, Liquid Extract of Liquorice 100, Morphine Hydrochloride 10, Solution of Atropine Sulphate 20, Oil of Peppermint 2, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains :—Chloroform 1½ minims, Morphine Hydrochloride $\frac{1}{11}$ grain, Solution of Atropine Sulphate, $\frac{1}{5}$ minim.

Dissolve the Morphine Hydrochloride in the Liquid Extract of Liquorice, Glycerin and Atropine Solution, previously mixed : in part of the Alcohol dissolve the Chloroform and Oil of Peppermint ; mix with the morphine solution, and add Alcohol *q.s.* to 1,000.

A useful sedative.

[D] [P1] **Capsules** (Gelatin) contain 5 minims for use of travellers.

[D] [P1] **Tinctura Chloroformi et Morphinæ Composita** (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 75, Morphine Hydrochloride 10, Diluted Hydrocyanic Acid 50, Tincture of Capsicum 25, Tincture of Indian Hemp 100, Oil of Peppermint 2, Glycerin 250, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains :—Chloroform ¾ minim, Morphine Hydrochloride $\frac{1}{11}$ grain, Dilute Hydrocyanic Acid ½ minim, Tincture of Capsicum ¼ minim, Tincture of Indian Hemp 1 minim.

Contains approximately four times the proportion of morphine present in the preparation of *B.P.* 1885.

N.B.—Contains Hydrocyanic Acid which the Chloromorphia Solution does not.

[P1] **Tinctura Chloroformi et Morphinæ B.P. '85** (*Not* within D.D.A.).

Syn. CHLORODYNUM, N.H.I.

Dose.—5 to 10 minims.

10 minim dose contains Chloroform ¼ minim, Ether ⅓ minim, Alcohol 90% ¼ minim, Morphine Hydrochloride $\frac{1}{48}$ grain, Dilute Hydrocyanic Acid ⅛ minim, Peppermint Oil $\frac{1}{80}$ minim, Liquid Extract of Licorice 1¼ minim with Treacle and Syrup *q.s.*

Poisoning by 4 ounces of Chlorodyne, with recovery by use of Atropine, Strychnine, and stimulants is recorded.

[P1] **Chlorodynum, N.H.I.**

When Chlorodyne is prescribed under N.H.I., Tinctura Chloroformi et Morphinæ *B.P.* '85 must be given.

The name Chlorodyne should not be applied to any preparation containing more than 0·1% Morphine *cf.*, p. 561.

A preparation falsely described as "Chlorodyne *B.P.* '85," contrary to the Merchandise Marks Act, 1887, resulted in penalties totalling £25 13s.—P.J. ii./29,130.

Ⓟ **Collis Browne's Chlorodyne** is *not* within the D.D.A. and contains no Hydrocyanic Acid. It contains 1·4% Liquid Extract of Opium (10% Morphine) and 0·21% of Codeine Phosphate, amongst other ingredients.

Spiritus Chloroformi (*B.P.* '14).—*Syn.* CHLORIC ETHER. 1 in 20 of alcohol (90%). U.S. has 3 in 50.

Dose.—30 to 40 minims (**2 to 2·5 Cc.**), or 5 to 20 minims (**0·3 to 1·2 Cc.**) repeated.

Tinctura Chloroformi Composita. B.P. 1885. Chloroform 2, Alcohol 90% 8, Compound Tincture of Cardamoms 10.

Dose.—5 to 60 minims.

Emulsio Chloroformi U.C.H.

Chloroform 5, Quillaia Tincture 2, Water to 100.—St. Th. H. Chloroform 8, Senega Tincture 1, Water to 160. Employed to preserve vegetable preparations.

Ethylene. $CH_2 : CH_2 = 28{\cdot}0312$. *Syn.* Olefiant Gas.

The first known member of the Alkylene or Olefine series of hydrocarbons—*i.e.*, the series in which a double linkage occurs. Ethylene is a colourless gas with slight ethereal odour. It has Sp. Gr. 0·9784 (Air=1). It burns in air with a bright flame. A mixture with 3 vols. of Oxygen *burns with violent explosion.* At 0° C. and under a pressure of 42·5 atmospheres it is converted into a colourless liquid which boils at—102° C. The gas is very soluble in Alcohol and Ether. It is a constituent of illuminating gas.

Anæsthetic Use.—Ethylene has been experimentally shown to possess many advantages when deep surgical anæsthesia is required. A proportion of 80 to 90% of the gas is used. Analgesia comes on easily, respirations remain regular, no cyanosis or suggestion of asphyxia observed, and recovery from the anæsthesia is always rapid. Is usually administered with Oxygen.—A. B. Luckhardt and J. B. Carter, Jl. A.M.A., Mar., 17/1923, p. 765; B.M.J.E. i./23,62; P.J. i./23,456.

For a review of its anæsthetic uses *vide* L. ii./23,240. There were 14 instances of vomiting in a series of 92 inhalations.

The **relative toxicity** and potency of gas anæsthetics might be expressed as follows. Ethylene being taken as unity: Nitrous Oxide 0·85, Acetylene 1·5, Propylene 2·25, Butylene 4·5, Amylene 15.—F. H. McMechan, B.M.A. Ann. Meeting, 1926, L. ii./26,331.

Urological Operations. Ethylene said to be the best anæsthetic, but its use requires a certain amount of experience. The average time for complete anæsthesia is five minutes, and as a rule awakening is without agitation or vomiting. Pantopon subcutaneously before administration suppresses period of excitation.—Jl. A.M.A. ii./25,1742.

Ethylene resembles Ether and Nitrous Oxide in speed, is less irritating than Ether, but more so than Nitrous Oxide. Induction by Nitrous Oxide-Oxygen, followed by Ethylene-Oxygen, returning to Nitrous Oxide-Oxygen towards close of operation. More depressing and powerful generally than Nitrous Oxide.—E. I. McKesson, B.M.J. ii./26,1111—1113.

Noticeable lack of after-effects the chief advantage. Methods of preparation and administration described.—C. Langton Hewer, L. i./25,173.

At Presbyterian Hospital, Chicago, 1,100 cases anæsthetised with Ethylene without serious condition.—L. i./25,1129.

Majority of patients make excellent recovery and are soon ready to take food. *Avoid risk of explosion.*—F. E. Shipway, L. i./25,1128.

Signs of anæsthesia with Ethylene and Oxygen.—J. S. Lundy, B.M.J. ii./26,1112.

Specially suitable in diabetic cases.—E. J. Chambers, B.M.J. ii./28,77.

A survey of 425,000 Ethylene anæsthesias shows it is probably as safe as Ether, if not safer. The quantity of Ethylene capable of explosion is too small to produce considerable damage.—M. Salzer, Jl. A.M.A. i./29,2097.

Ethylene anæsthesia discussed at Roy. Soc. Med.—B.M.J. i./30,862.

Much more satisfactory than Nitrous Oxide—could be used with as much as 20% to 30% of Oxygen. Dangerous with cautery or diathermy.—I. W. Magill, L. i./31,353.

For *dental work* its smell and risk of fire is a disadvantage.—R. R. Macintosh, Brit. Dental Jl., Feb. 15/32.

By continued application of Ethylene or Propylene green fruit can be ripened, the same changes taking place as occur in the plant.—P.J. ii./27,562.

Propylene and higher homologues as gas anæsthetics. These new anæsthetics show by-effects that, for the present, challenge their safety and utility in clinical anæsthesia. Experiments with Methane, Propane, Pentane and Heptane do not offer any hope of a satisfactory clinical anæsthetic.—F. H. McMechan, B.M.J. ii./26,1106.

Propylene as an anæsthetic.—Jl. Ph. and Exp. Ther., Feb., '26,1. See also F. E. Shipway, L. i./25,1130 and our p. 118.

Acetylene. $CH \equiv CH = 26{\cdot}0156$.

The initial member of the Acetylene series of hydrocarbons (*i.e.*, with triple linkage), gas with unpleasant odour. It has Sp. Gr. 0·92

(Air=1). It is compressible into a liquid. This *liquid* form has explosive properties. It is more soluble in Alcohol than Ethylene. It is formed by the interaction of water with Calcium Carbide.

Acetylene 40% and Oxygen 60%, with the addition of Oil of Pine to mask the smell, used as ***general anæsthetic.*** Rapid, simple and safe, but for child-birth, like all other general anæsthetics, its defect is to diminish uterine contractions.—C. H. S. Horwitz, L. i./23,619.

Give 60% to start with, increase to 70% for full anæsthesia and reduce to 20 or 30% in a long operation.—Precede with Morphine and Scopolamine.—L. ii./23,240.

Acetylene thought to be an inefficient anæsthetic except in exceptional cases.—F. E. Shipway, L. i./25,1128.

Acetylene-Oxygen may supersede Chloroform and Ethyl Chloride-Ether in many operations. Has greater safety, vomiting rare, sense of comfort afterwards, serious sequelæ not observed, but danger of explosion. A 10% concentration will eliminate labour pains without loss of consciousness or diminution of uterine contractions.—H. Wieland, Brit. Jl. Anæsth., Jan., '25,142, per Pres., April, '26,142.

Acetylene 80% with Oxygen 20% as a general anæsthetic induced insensibility and muscle relaxation in three minutes. Toxic effect very slight and initial phase of excitation did not occur.—Comptes Rend., Oct. 30/25, per Jl. A.M.A. ii./25,1998.

In dental surgery Acetylene of value.—A. Goldman and J. D. Goldman, Anæsth. and Analges., Aug., '25,211, per Pres., April, '26,142.

2,000 anæsthesias made with Acetylene at gynecologic clinic. No deaths; post-operative pneumonia in only 0·3%, and bronchitis in 0·3%. Surpassed in obstetrics all classical types of anæsthesia.—D.M.W., Sept. 18/25, per Jl. A.M.A. ii./25,1437.

Dichlorethylene. *Syn.* ACETYLENE-DICHLORIDE $C_2H_2Cl_2=96·9296$.

The commercial product is a mixture of two stereoisomers boiling at 48° and 60°, and having Sp. Gr. of about 1·28. It is not readily inflammable and is suggested to replace Ether for laboratory use. It is the best known solvent for rubber.

Is employed as a solvent of Iodine for sterillising the skin. 2·5% w/v is used, *i.e.*, practically a saturated solution. This solution is said to cause the operating surgeon or assistants no lachrymation or catarrh of the nasal mucous membrane which the Iodine Tincture produces.

N.B.—The name **Dichloride of Ethylene** has been applied to this substance, *v.* B.M.J. i./10,1288. It has the composition $C_2H_4Cl_2=98·9612$. B. pt. 85° C. and Sp. Gr. 1·255 at 15° C., but it should be particularly noted that Dichlorethylene is required for the purpose.—P.J. ii./11,623.

Iodine in skin asepsis—comparative results with Dichlorethylene.—J. W. Peck, P.J. i./12,450.

Trichlorethylene. *Syn.* ✱WESTROSOL (T.M. 310199 Class I). $ClHC:C.Cl_2=131·3788$ Sp. Gr. 1·47, B.pt. 88° C.—difficult to volatilise, though a good solvent, especially for fats.

Trichlorethylene Sterules, 10 minims (0·6 Cc.) encased in cotton wool for inhalation through the nose, are made.

Uses.—Inhaled for trigeminal neuralgia several times a day.—B.M.J.E. i./22,86. Facial neuralgia. Inhalation of Trichlorethylene 20 drops through the nose. Patient lying down.—B. R. Johnston, B.M.J. i./30,180; B.M.J.E. i./31,115.

In commerce for the solution of tarry bituminous products, India-rubber, Sulphur, and Phosphorus.

✱WESTROPOL (T.M. 350667 and 352362, Class 2, 350668 and 352363, Class 47). A soap solution containing 25% Trichlorethyene and ✱WESTORAN (T.M. 433061, Class 2, and 433062, Class 47)—a soap solution containing 95% Tetrachlorethane $C_2H_2Cl_4=167·8436$

were found efficient as vermicides. For cleaning the body, bathing, or sponging with soap solutions containing 2% Trichlorethylene or 10% Tetrachlorethane give good results. Further, a 25% solution of Trichlorethylene in Vaseline would be an efficient insect pomade. Dichlorethylene also useful—J. P. Kinloch, B.M.J. i./15,1038.—P.J. ii./16, 384; i./20,243.

The parasiticidal action of the Chlorhydrocarbons, especially of Tetrachlorethane.—J. W. Dougal, C. and D. i./25,199.

Tetrachlorethylene, $C_2Cl_4 = 165{\cdot}828$. *Syn.* **Perchlor-Ethylene. Carbon Dichloride** (CCl_2).

Heavy liquid (Sp. Gr. 1·619), B. pt. 110° to 120°, solvent of fats, resins, rubber and alkaloids. Used for dry-cleaning and for solvent soaps. Originally investigated by Faraday. Difficult to volatilise. Gives a heavy vapour which caused death in aircraft works when used in a cellulose varnish. (*cf.* Carbon Tetrachloride which is similar and has also produced death).

All these bodies are non-inflammable and non-combustible.

A mixture of 10% Petroleum Ether in it readily burns and a mixture of 10% Benzol with it will not burn, but any higher percentage burns readily.—W. H. M.

ANKYLOSTOMIASIS.

Trials with Tetrachlorethylene for hookworm showed no reason why this compound should replace Carbon Tetrachloride. The doses given were 2 to 4 Cc. in 2 ounces of saturated Magnesium Sulphate solution.—Col. Med. Report, p. 11, per Jl. Trop. Med., Feb. 1/27.

In hookworm not effective. There is no sure and safe anthelmintic against hookworm.—L. i./30,418.

LIVER FLUKE in sheep treated.—P.J. i./31,29.

Tetrachlorethane. ✱WESTRON (T.M. 310198 Class I.). $C_2H_2Cl_4 = 167{\cdot}8436$.

A liquid with penetrating odour B.pt. about 140° C. It dissolves oils, fats, waxes, and resins, and Sulphur (1% at ordinary temperature), Phosphorus and Chlorine.

Used as a solvent for varnishes, especially Cellulose Acetate, and as a paint-remover and degreaser. Extensively employed as an insecticide, especially for white fly on tomato plants, and for weevils.

See also Westoran.

Pentachlorethane, $C_2HCl_5 = 202{\cdot}2958$, is similar to Tetrachlorethane, and has B.pt. 159°.

Hexachlorethane, $C_2Cl_6 = 236{\cdot}742$.

A solid subliming at 185° without melting: almost insoluble in water, more soluble in Alcohol and Ether, or a mixture of the two. It has a smell similar to Camphor, for which it is used as a substitute in the Celluloid industry. Also employed to render substances non-inflammable in explosives industry, and is incorporated in anti-fouling plants.

Physiological experiments:—The saturated solution has no effect on muscle hence its toxic effect is considerably less than that of Chloroform (compared per molecule or per weight), with which of course it is chemically allied. Rats were fed with butter mixed with the crystals—no effect produced after 24 hours.

Cyclohexanol and Allied Compounds.

Cyclohexanol ($C_6H_{11}OH$) is prepared by the catalytic hydrogenation of Phenol, using Nickel at about 180° C. It is a solvent for fats, waxes, resins, rubber, celluloid, etc., but is principally used in conjunction with soaps—with which it forms clear aqueous solutions—as a detergent in laundry and textile work. The commercial product is known as **Sextol** in this country,

and as ✱**Hexalin** (T.M. 409135) in Germany. Its derivatives, Cyclohexano-Acetate (Sextate) and Cyclohexanone (Sextone), and also the Methylcyclol hexanols (Methylhexalin), produced by hydrogenation of the mixed Cresols, are similarly employed.

Trichlorisopropyl Alcohol. *Syn.* ✱Isopral (T.M. 322543). $CCl_3.CH(OH).CH_3$=163·41.

Used for intravenous narcosis. Has been given up to 8 Gm. (*in toto*) as an anæsthetic. A mixture of this and Hedonal (*vide* Edn. XVI., p. 783) may be useful.—R. K. Lambert, L. i./26,121, see also E. R. Flint, *ibid* 257. Employed in eclampsia in children.

CHRYSAROBINUM (*B.P.* '14), U.S., P. Jap., Ph. Ned. V., P. Ital. V., F.E. VIII., $C_{30}H_{26}O_7$=498.2028. *Syn.* Commonly but erroneously called Chrysophanic Acid.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain (**0·01 to 0·03 Gm.**) or more.

This substance was erroneously stated to contain 80 to 84% of Chrysophanic Acid, but it was subsequently shown that the Acid was developed from the Goa Powder (*q.v.*) by the Alcoholic Solution of Potash used in extraction. It consists chiefly of Chrysarobin, with varying amounts of Chrysophanic Acid. *Further details, see Vol. II.* It is obtained from Araroba by means of hot chloroform.

It might be renamed '**Araroba Purificata.**'

A tasteless inodorous crystalline yellow powder. It is contained in rhubarb (mainly as Chrysophanic acid) and dock root. Ash limit 1%.

Solubility.—In alcohol and slightly in petrol and water; in Ether 16, Chloroform 12, 1 in 18 Benzol.

Uses.—Externally as ointment or pigment. Chrysarobin is a powerful stimulant and parasiticide in acne rosacea, alopecia, psoriasis, lupus, ringworm of the scalp, pityriasis and tinea circinata.

Psoriasis in the army treated by Chrysarobin and Salicylic ointments or n Lassar's Paste.—H. W. Barber, B.M.J. i./18,369.

The only reliable local remedy to remove the eruption with promptitude, but recurrence after its use just as frequent as with other remedies.—B.M.A. Ann. Meeting, '26, L. ii./26,550.

Unguentum Chrysarobini (*B.P.* '14).

4% in Soft Paraffin. U.S. has 3 in 50 of Benzoated Lard.

It stains the skin and hair, and a strong ointment after three days' continued use sometimes produces feverishness and irritation. 5 to 10 grains to an ounce may be better. Its stains can be removed by Benzol, weak solution of Potash or Chlorinated Lime.

Unguentum Chrysarobini Compositum (Unna) and St. J. H.

Chrysarobin 5, Salicylic Acid 2, Ichthyol 5, Soft Paraffin 88.

Psoriasis is treated by an ointment of Chrysarobin 5, Salicylic Acid $2\frac{1}{2}$, Birch Tar (Oleum Rusci) 5, Soft Soap $6\frac{1}{2}$, Vaseline $6\frac{1}{2}$.

Baculum Chrysarobini.

Chrysarobin 30 grains, Wax 20 grains, Lanolin 50 grains.

Ⓟ**Pigmentum Chrysarobini.**—*Adopted by G. H.*

Chrysarobin 1; Gutta Percha Solution (*B.P.* 1885), 9.

In psoriasis, painted on twice a day with a brush for ten days without washing—finally washing off.

℗**Traumaticin** (*Martindale*), adopted by P. Belg., P. Ital. V., F.E. VIII. and Ph. Ned. V., composed of Gutta Percha (purified) 1, Chloroform (by weight) 9, is also used for making the above pigment. More cleanly than liniments or ointments.

Pigmentum Chrysarobini et Pyrogallol.

Chrysarobin 1, Pyrogallol 1, Ether and Alcohol, of each 10, Collodion 120. Apply after bathing every third day for psoriasis and ringworm. Chrysarobin may also be applied with Camphoid, *q.v.*

℗**Suppositorium Chrysarobini.**

Chrysarobin $1\frac{1}{4}$ grains, Iodoform $\frac{3}{10}$ grain, Belladonna Extract $\frac{1}{7}$ grain, Glycerin *q.s.* to make a suitable paste and Cacao Butter *q.s.* to 30 grains. Gives good results in hæmorrhoids.

Araroba. *Syn.*, **Goa Powder** (*B.P.* '14). **Crude Chrysarobin. Araroba Depurata, P. Austr.**=Chrysarobinum.

A brownish concretion from the cavities in the trunk of *Andira araroba* (*Leguminosæ*), dried and powdered.

Crude Araroba is imported from Brazil; not less than 50% of its weight is chrysarobin, or chrysophanic acid so-called. The Indian mode of using the drug was to cut a lime fruit, dip it in the powder and dab it on the affected skin. The Brazilians mix it with vinegar.

Chrysarobin Tri-Acetate. A brownish powder recommended as a substitute for Chrysarobin. Solutions of 2 to 3% are said to be effective and free from toxic effects, non-irritant, and do not stain. It is soluble in Ether, Chloroform and in Acetone. **Lenirobin is Chrysarobin-tetra-acetate.**

✱**Cignolin** (T.M. 354703).

A synthetic Chrysarobin substitute, free from toxic action on the kidneys, in psoriasis and other skin diseases. Deodorised Oil of Cade 40 minims, Cignolin $\frac{1}{2}$ grain, Benzol 1 oz. used. Paint twice daily and cover with dry white gauze. Reduce Cignolin by half if irritation caused.—L. ii./31,754.

CINCHONÆ CORTEX.

(*Rubiaceæ*).

Tercentenary Cinchona Celebration. (The 300th Anniversary of the first recognised use of Cinchona by Europeans.) Addresses on the History of Cinchona by Sir Humphrey Rolleston and Sir David Prain. There are 3,000—4,000 acres under Cinchona in India, yielding 40,000 lbs. of Quinine per annum. The medical man must determine whether the alkaloids other than Quinine are equally efficacious in malaria.—B.M.J. ii./30,969,1090. L. ii./30, 1355, 1422. P.J. ii./30,621.

The principal dried barks used for the production of the salts of the Cinchona alkaloids are:—Red Cinchona bark, from *Cinchona succirubra*; Yellow Cinchona bark, obtained from *Cinchona Calisaya*, containing upwards of 6% of alkaloids (half of which is quinine); pale Cinchona bark (crown or Loxa bark), from *Cinchona officinalis* (containing 5% alkaloids of which half may be quinine); the bark of *Cinchona lancifolia*, Mutis; Columbian bark (containing about 2% alkaloids, of which only a small proportion is quinine); and other species of Cinchona; that of certain species of Remijia may also be used. The variety most used for making galenical preparations is the cultivated Red Cinchona.

Cinchona, U.S., is from various species. 5% total alkaloids.

C. CALISAYA, Quinquina Jaune, is official in FR. Cx. for making Extract. 1000 Gm. of good Calisaya Bark should yield 30 Gm. of Quinine Sulphate ($+8H_2O$)=25 Gm. approx. of anhydrous Quinine Sulphate=22 Gm. approx. of anhydrous Quinine.

C. SUCCIRUBRA, FR. Cx. Quinquina Rouge is to contain at least 50 Gm. total alkaloid=15 Gm. Quinine Sulphate ($+8H_2O$)=12½ Gm. approx. anhydrous salt dried at 100° C.=10·9 Gm. approx. of Quinine base anhydrous—per 1000 Gm. of bark.

P. ITAL. V. prescribes Calisaya or Succirubra bark containing at least 5% alkaloids. F.E. VIII. officialises Calisaya, Loja and C. Succirubra. P. Belg. IV. has C. Succirubra and 'other species' containing at least 6·5% alkaloids.

The Quinine barks, as they are called, now imported from South America, are chiefly the Calisaya in quills; those known as Cuprea barks, the produce of species of Remijia, are more expensive. A larger quantity of cultivated bark, the produce of *C. succirubra, C. officinalis,* and hybrids, arrives from Madras and other parts of India. Most of the rich Java bark, produced by *C. Calisaya, var. Ledgeriana,* has hitherto been shipped to Amsterdam.

The old natural "flat" Calisaya bark is not now met with, but a kind of yellow bark, pressed into flat pieces, is imported from Bolivia to replace it. The flatness is produced by tight packing in serons bound with green hide thongs which, contracting, keep it flat.

There is a large demand for '**Factory**' **Cinchona Bark,** *i.e.,* barks of Cinchona Ledgeriana and certain Cinchona hybrids, rich in Quinine and containing comparatively small amounts of other Cinchona alkaloids, for making Quinine. Effort should be made to produce in India sufficient of the commodity to meet a much larger proportion of the requirements of the Empire. There is at present only one Quinine factory making Quinine from bark in Great Britain.—Imp. Inst. Com. for India.—L. ii./22,526.

The **Amani Institute** (in what was German E. Africa) having passed into British hands, we are now in possession of some *C. Ledgeriana-C. Succirubra* hybrids which are amongst the most profitable species of Cinchona in the world from the standpoint of Quinine. Some were shown to yield up to 11·83% Total Alkaloid and 6·97% Quinine.—Prof. Greenish and C. E. Corfield, B.P. Conf., 1923, P.J. ii./23,95.

The only Cinchona it is possible to produce without financial loss is Yellow Bark, and this has put it beyond the power of our Empire to supply its own requirements as regards Quinine. History of the use and cultivation of the Bark.—B.M.J. i./24,1023.

Nine-tenths of the world's supply of bark ***comes from Java.*** Cinchona requires fastidious conditions—a mean temperature of about 75° F. Some shade. Rainfall of 75 to 180 inches. Altitude of 1,000 to 5,000 ft. Rich porous soil.—L. ii./29,834.

For further details on History, Cultivation, etc., see Quinine and Vol. II.

Cinchonæ Rubræ Cortex, Red Cinchona Bark (*B.P.* '14). *Dose.*—5 to 60 grains (**0·3 to 4 Gm.**). P. HELV. has minimum 6·5% alkaloids. FR. Cx. has 5%, *vide antea.*

The dried bark of the stem and branches of cultivated plants of *Cinchona succirubra.* Tested by *B.P.* '14 process, it should yield between 5 and 6% of total alkaloids, of which not less than one-half should consist of Quinine and Cinchonidine.

Total alkaloids of Cinchona.—Self and Corfield's modification.—P.J. ii./30,98.

Flavorings.—as for Quinine *q.v.*

Uses.—The bark in the form of the Liquid Extract, Tincture and its alkaloids has extended use as a bitter tonic. Taken, as such, in powder form it is astringent, giving a feeling of warmth in the epigastrium and occasionally causing vomiting. For further data see the Alkaloids Quinine, Quinidine, etc.

Decoctum Cinchonæ. *B.P.* 1885.—1 produced 16. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**).

Elixir Cinchonæ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).
Liquid Extract of Cinchona 1, Simple Elixir 7. Mix.

Extractum Chinæ.
Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).
Fr. Cx.—Aqueous extract containing not less than 6% alkaloids. Ph. Ned. V., 14 to 18% alkaloids, P. Ital. V. 10%.

Extractum Cinchonæ Liquidum (*B.P.* '14).
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).
This contains 5% of total alkaloids, and is an acid preparation 1= about 1 of bark.

If prescribed with Acid, as in the following :—Spirit of Chloroform 1½ drachms, Nitro-hydrochloric Acid 1½ drachms, Liquid Extract of Cinchona 1½ drachms, Water to 6 ounces, mix the first three in order written, and pour into the water to produce best result.

Liquid extract of red bark has been much lauded in America for giving drunkards a distaste for alcohol.

Only about 20% of the total alkaloids in Cinchona can be extracted by Dilute Hydrochloric Acid, as in making this liquid extract Glycerin does not exert a solvent action on the alkaloids : best to add it at end of the process. The B.P. 1898 Assay process is best.—O. Chick, P.J. ii./17,144 ; C.D. ii./17,612.

For further Notes on Assay, see Vol. II.

Fluidextractum Cinchonæ, U.S. *Average dose.*—15 minims. Standardised to 4·5% alkaloids, *w/v*.

Extrait de Quinquina Rouge (Fluide) Fr. Cx. Supp. 1920, is made by percolation with dilute Hydrochloric Acid and contains 3·5% total alkaloids. **P. Ital. V.** contains 5% total alkaloids.

Tinctura Cinchonæ (*B.P.* '14).
Dose.—½ to 1 drachm (**2 to 4 Cc.**).
About 1 in 5 of 70% alcohol ; standardised to about 1% of alkaloids. **U.S.** not less than 0·8 or more than 1% of alkaloids. **P. Ital. V.** not less than 1%.

Maceration for 24 hours with ½ ounce hide powder to the pint is said to detannate the tincture.

Mistura Antidipsomania. N.H.W. (Not in E.G.A.)
Tincture of Cinchona 1 drachm, Glycerin ½ drachm, Tincture of Capsicum 3 minims, Decoction of Cinchona to ½ ounce.

Tinctura Cinchonæ Composita (*B.P.* '14).
Syn. Huxham's Tincture of Bark. About 1 in 10 of 70% alcohol. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). **U.S.** is similar.

***Vibrona.** (T.M. 187745 Class 3 and 245073 Class 42.) A wine containing the alkaloids of Cinchona. A wineglassful contains the combined alkaloids of 5 grains of Cinchona Bark in the form of Hydrobromides. Total alkaloidal content 0·025%.

Vin de Quinquina Officinal (Fr. Cx.)

Macerate Cinchona 25 with Dilute Hydrochloric Acid 2, Alcohol 60% 75, for 24 hours, shaking occasionally. Add Red Wine 920, macerate 24 hours and filter.

Dose.—½ to 5 ounces (**15 to 150 Cc.**). Less for children.

Vinum Chinæ. P. JAP. IV. Dose 1 to 4 drachms. Dissolve Gelatin 1, by warming in Distilled Water 10, and add Sherry 1,000, Cinchona Bark in coarse powder 40. Macerate for eight days; press and in the expressed liquid dissolve Sugar 100, Tincture of Bitter Orange Peel 2: set aside in a cool place for 14 days and filter.

CINNAMOMI CORTEX.

The dried bark from *C. zeylanicum* (*Lauraceæ*).

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Aromatic, carminative and antiseptic, employed as flavouring agent. Contains volatile oil and tannin. *B.P.* '14 are Compound Powder (1 in 3), Water (1 in 10), Spirit (1 of oil in 10), and Tincture.

P. JAP. IV. and U.S. X. have Cortex Cinnamomi *Loureirii, Syn. Nikkei Bark*, Japanese Cinnamon Bark.

Tinctura Cinnamomi (*B.P.* ' 14). *Dose.*—½ to 1 drachm.

1 in 5 alcohol 70%. Alcohol 60% would do equally well.

Tinctura Cinnamomi Composita P.L.

Dose.—20 to 40 minims (**1·2 to 2·4 Cc.**).

Cinnamon Bark 16, Cardamom Seeds 8, Long Pepper 5, Ginger 5, Alcohol 60% 640. Macerate seven days.

Oleum Cinnamomi (*B.P.* '14). **U.S.**

Dose.—½ to 3 minims (**0·03 to 0·2 Cc.**).

Contains 55 to 65% Cinnamic Aldehyde by volume. **U.S.** requires 80%. *For Analytical Data, see Vol. II.*

The light yellow oil distilled from the bark. The Chinese oil, as distinguished from that made in Ceylon, is known as **Cassia Oil.**

Leaf Oil is practically free from Cinnamic Aldehyde.

Soluble in alcohol 90% about 10 in 3.

Cinnamon oil is used in influenza and catarrhs. Is occasionally prescribed as an inhalation (30 to 40 minims) with boiling water 1 pint.

Stimulates the heart reflexly and directly dilates blood vessels, thus exerting valuable action on vaso-motor system. Action on bronchial tubes anti-spasmodic. Should be given in 20 minim doses in milk (or on sugar) for first three hours, every other hour 15 minims for two doses, then three or four hourly 10 minim doses. If patient can take to bed cure will be rapid. (*See also* Oleum Eucalypti). Cinnamon oil relieves toothache.

In chronic deep-seated sepsis, such as internal venous thrombosis with pyrexia and other constitutional symptoms, more general use of Essential Oils advocated. It is a good plan to vary the Oil, *e.g.*, 10 minims four times daily in capsules of Cinnamon one day, Cloves the next, Peppermint, and so on. The antiseptics in this way saturate the system. Not on empty stomach.—H. French, Woolwich Medical Association.

Children exposed to infection by German Measles have been prevented from taking the disease by powdered Cinnamon—as much as will lie on a sixpence or shilling with their food night and morning. Should be tried in measles also as a prophylactic.

ACUTE CORYZA.—Spirit of Cinnamon in 25 drop dose one of the most effective remedies.—W. B. Drummond, B.M.J. i./17,765; ii./17,32.

Capsule of Cinnamon Oil, 2½ minims increased to 5 minims, with **Quinine Sulphate** 1 grain, are used in influenza.

Cinnamon Dental Paste. Iodoform made into a paste with Cinnamon Oil.

COAL TAR DERIVATIVES.

Pix Carbonis, COAL TAR, *Syn.* STEINKOHLENTEER, PIX LITHANTHRACIS, OLEUM LITHANTHRACIS, GOUDRON DE HOUILLE.

The Aromatic series of derivatives from coal tar, so freely used as antipyretics and analgesics, produce changes in the blood, diminishing its respiratory capacity and destroying red corpuscles if used in excess.

***Liquor Carbonis Detergens.** (*Wright's*). (T.M. 7418 & 7419).

(A formula for a solution is given in P.G. VI.)

This alcoholic preparation owes its properties in part to Phenol. Used as a Lotion, from 1 drachm to 1 ounce to a pint of distilled water it forms a yellowish milky emulsion; or, as an Ointment, Liquor Carbonis Detergens 1, Unguentum Hydrargyri Nitratis 3, Unguentum Simplex 4. In prurigo and chronic scaly skin diseases.

The following is also useful in eczema: Liquor Carbonis Detergens 2, Liquor Plumbi Subacetatis 2, Zinci Oxidum 4, Glycerinum 4, Aqua 36. *Vide also* **Wright's Coal Tar Soap.**

A *Coal Tar Inhaler and Vaporiser is made for treatment of whooping-cough, croup, bronchitis, influenza and like affections.

Balneum Picis Carbonis. *Syn.* **Balneum Bituminis,** L. H.

Solution of Coal Tar 8 ounces, Water at 95° F. 30 gallons.

Lotio Plumbi Detergens, V.H.C. One drachm to a pint of water. Liquor Carbonis Detergens 2½, Liquor Plumbi Subacetatis Fort. 1.

Unguentum Picis et Acidi Salicylici, V.H.C.

Liquor Carbonis Detergens 30 minims, Salicylic Acid 15 grains, Ammoniated Mercury 5 grains, Soft Paraffin to 1 ounce.

In psoriasis 1 in 8 and in pruritus ani.

Liquor Picis Carbonis (*B.P* '14).

A solution made by dissolving Prepared Coal Tar 2, in a 10% Tincture of Quillaia Bark 10 parts made with 90% Alcohol at 50° C. and filtering.

Lotio Picis Carbonis Alkalina. St. Th. H.—Liquor Picis Carbonis 1 drachm, Sodium Bicarbonate 120 grains, Water to 1 pint.

Lotio Picis Carbonis Aromatica.

Coal Tar 3 ounces, Ether 2 ounces, Spirit 1 ounce. Dissolve, filter and add Peruvian Balsam 6 drachms, Salicylic Acid 1½ drachms.

Liquor Picis Ligni may be prepared by dissolving Wood Tar 1 in 20 of a Tincture of Quillaia 1 in 10 of Alcohol 90%.

One part to 7 or more is useful for skin affections. The Tincture of Quillaia enables tar solutions to form emulsions with water.

Aqua Picis, Ph. Ned. V., 5%, by mixing with Pumice.

Alopecia areata has been treated by this preparation. Hair grew completely.—P. S. Abraham.

Bitumen. A name given to various inflammable hydrocarbon mixtures, even colorless naphtha or rockoil of Sp. Gr. 0·7 to 0·8, but in this country we should associate it with Asphalt or of similar consistence. The name is also given to the residue after distilling petroleum products. Liquor Bituminis, *Syn.* **Bitumarine** is an anticorrosive paint.

Acriflavine. *Syn.* **Trypaflavine. Diamino-Methyl-Acridine Chloride Hydrochloride.** $C_{14}H_{14}N_3Cl.HCl.=296·055$.

Dose.—5 grains have been given, but Euflavine is more used *per os.*

Chemical Composition.

Confused statements appear in the literature as to the composition of this body. It is the Hydrochloride as indicated in our formula, and our analyses confirm the statement. In comparison with Euflavine, which is a monochloride, Acriflavine may be viewed as a dichloride.

***Trypaflavine.** TRADE MARK (No. 327437, Class 1).

There are *no proprietary rights* in the word Acriflavine. For details of Patent expired, see Edn. XIX., p. 300.

Manufacture.—Details of the process are given by Benda (Ber. 45, p. 1787, *et seq.*) and in the patent specification. See also Edn. XVIII., p. 313.

In the patent specification it is stated that, compared with its higher homologues, such as Acridine Yellow (which is 3 : 6—diamino—2 : 7 dimethyl-acridine Hydrochloride) this body has the advantage of being very soluble, and these hitherto 'unknown salts of 3 : 6 Diamino—10 alkyl or aralkyl Acridine have proved specifics against trypanosomes.'

It might be made by a method other than that of the patent.—See C.D., July 14/17, p. 609.

Acridine Compounds—3 : 6 **Diamino-Acridine** preparation.—Poulenc Freres & R. Meyer, Pat. 137,214 Abst. J.C.S.A. i./20,252.

Properties.—The compound is in the form of a reddish brown crystalline powder.

The trypanocidal property depends greatly, Browning says, on the presence of the methyl group attached to the Nitrogen atom—this is implied, though not expressly stated, in Benda's work.

It may be added that the Acridine series of dyes have as initial member **Acridine** $C_6H_4<\overset{CH}{\underset{N}{\cdot}}>C_6H_4$. They are formed by heating Diphenylamine with fatty acids in presence of Zinc Chloride, *e.g.* $(C_6H_5)_2NH+H.COOH=(C_6H_4)_2N-CH+2H_2O$.

Solubility.—In water 1 in 5. Commercial samples we find vary considerably. In alcohol 1 in 40. In glycerin 1 in 4 or less. Insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—by experiment—W. H. M., 1917. Concentrated aqueous solutions are brown, dilute ones lemon yellow with green fluorescence.

Compatible with Normal Saline if required for immediate use, but we observe a deposit after about 24 hours. Concentrations of Saline higher than 5% throw out a precipitate almost at once.

Compatible with 0·5% Sodium Citrate.

Incompatible with Dakin's Solution, Eusol and other Chlorine Antiseptics. Also with Mercuric Chloride Solution (*e.g.* 1 in 1,000 as used), also with Phenol (*e.g.*, 1 in 20 solution)—by our experiments.

Solutions may be boiled or heated in an autoclave to 130° C.

To remove Acriflavine stains from the hands, etc.—Rub with a little dilute Hydrochloric Acid or with a little dilute Sulphurous Acid, or with Sulphurous Acid followed by Hydrochloric Acid, and then wash with water.

Antiseptic Powers.—It is markedly antiseptic especially ***in serum,*** and it has trypanocidal powers, hence the name Trypaflavine.

The ideal antiseptic, it is held, should have potency in the presence of serum —Acriflavine has: it must stimulate granulating processes: it should not interfere with phagocytosis, nor irritate the tissues. The potency of Acriflavine is enhanced by blood proteins. Diamino-Acridine derivatives in serum are the most potent bactericides known.

Diamino-Acridine Sulphate (**Profavine**) has similar properties, though it is not so curative in trypanosome infections. This salt intravenously in rabbits renders the serum antiseptic or augments its bactericidal power, even several hours after injection.—C. H. Browning and R. Gulbransen, Proc. Roy. Soc., B. Vol. 90, 1917, p. 140.

Phenol, Iodine, Hypochlorites, Malachite Green, Mercuric Chloride, Crystal Violet, and other dyes, were examined. Acriflavine is 20 times more powerful against *S. aureus* than Perchloride and 800 times more so than Phenol or Chloramine-T in these conditions.

Most antiseptics are very inimical to phagocytosis, hence their action is a mixed blessing. The higher the germicidal power in serum and the lower the hindering of phagocytosis the more useful the antiseptic.

Pharmacology.—M.L.D. intravenously for dog and rabbit 30 mgr. per kilo. Dogs injected intravenously at short intervals with doses from 5 to 25 mgr. per kilo develop pathogenic liver and kidney changes with extensive destruction of erythrocytes and derangement of metabolism.—R. S. A. Heathcote and A. L. Urquhart, Jl. Pharm. & Exp. Therap., Feb., '30,160.

The **Therapeutic Coefficient** ("**T.C.**") of Browning is the ratio between the highest concentration of the substance, which does not reduce the phagocytic count below half that of the control, to the weakest concentration of the body, which is sufficient to kill *Staphylococci* in the presence of serum. Acriflavine and Brilliant Green gave the highest ratios. Acriflavine is less irritating to conjunctival epithelium than Brilliant Green. Both stimulate granulation in wounds.

The " T.C." of Acriflavine is 200, *i.e.*, it kills both *cocci* and *B. Coli* in concentration of 1 : 100,000, whereas to affect phagocytosis a concentration greater than 1 : 500 is requisite.

T.C. of Mercuric Chloride is $\frac{10000}{7000}=1{\cdot}4$; of Phenol $\frac{250}{500}=0{\cdot}5$, and so on.

The germicidal value of Acriflavine on *staphylococcus* in Broth and in human serum and in pus was found lower than that given by Browning. Its action too is very slow, ***not less than 24 hours' contact*** being adopted by Browning for the experiments. *Staphylococcus* in pus is not killed by 1 in 1000 Solution.—R. T. Hewlett, L. ii./17,493,727.

Browning turned the table by replying that the view that a substance to possess therapeutic value as an antiseptic must rapidly kill organisms is a time-hallowed test—witness phenol and mercuric chloride which do not put an end to suppuration in an infected wound.—*ibid*—p. 622.

A. Fleming criticised Acriflavine as " therapeutically unsound " and that there is nothing to specially recommend it for use to septic wounds. A concentration of 1 in 2000 he finds inhibits leucocytic emigration, that even 1 in 3200 strongly agglutinates human red corpuscles, that 1 in 500 solution is usually unable to sterilise an equal volume of pus from a wound in 24 hours, that 1 in 500 injected into the pleura or peritoneal cavities loses its antiseptic power in 2 hours.—L. ii./17,341. An equally powerful reply by C. H. Browning.—*ibid.* 437. A. Fleming's rejoinder.—*ibid.* 508.

Chemotherapy of Pyogenic infections with special reference to the antiseptic properties of the Acridine compounds.—The flavines are the most efficient antiseptics therapeutically so far investigated. *S. aureus* and *B. Coli* used. '**Fragments**' of the Acridine Molecule were examined—these showed a low grade of antiseptic power—as also **Phenazine** Compounds.—C. H. Browning and J. B. Cohen, B.M.J. ii./21,695.

Acriflavine and Rivanol.

ACTION ON STREPTOCOCCI.—Experiments in vitro gave unsatisfactory results—individual behaviour of animals the predominating factor. In some cases 1 in 4000 did not prevent inflammatory condition, and in others 1 in 40,000 was effective. In vitro, using serum, Acriflavine varied between 1 in 1,000,000 and 1 in 100,000 and Rivanol 1 in 400,000 to 1 in 20,000.—C. H. Browning and B. Gulbransen, Jl. Ph. & Exp. Therap., '28,187.

Flavine inflicts a certain amount of damage on white blood corpuscles. It loses its power by being absorbed by muscle, dressings, etc.—Sir A. Wright, B.M.J. ii./30,735.

Acriflavine has selective injurious action on liver and kidneys when injected intravenously in rabbits.—Jl. A.M.A., Jan. 17, '25,166, per Pres., Jan., '26,6.

Neither staphylococcal nor streptococcal infections are touched by Acriflavine, when distributed to them through the blood stream.—E. L. Walker, Jl. Pharm. & Exp. Therap., XXVI., No. 6, p. 461.

Strengths of Acriflavine Solutions for Use.—Solutions of 1 in 1,000 in normal saline are recommended. This strength (= on the basis of bactericidal concentration to an 80% Phenol solution in the case of *Staphylococci*) is used to the surface of wounds without causing pain or irritation.

The dye is advised for prompt use to wounds, soon after infliction, to prevent sepsis, by destruction of virulent organisms before they have time to gain a foothold and to multiply—*e.g.* for casualty work, this solution may effect healing by first intention.

The muscles round the site of an infected wound may be injected with several ounces of 1 : 1,000 solution without ill effect.

Acriflavine Tablets are made 0·87 grain to produce 2 ounces of 1 in 1,000 solution, also 1·75 grains to make 4 ounces.

Use in conjunction with Hypertonic Saline.—The 1 in 1,000 solution is not precipitated by adding Sodium Chloride up to 5% strength or by 0·5% Sodium Citrate.

Suppurating Wounds.—Acri- or Proflavine solution 1 in 1,000 is used to swab out the open wound once or twice a day *after free drainage has been secured.* All the crevices of the wound are to be reached and sloughs, etc., removed. Then lightly pack with gauze steeped in the solution and cover with a " protective " Several ounces of the solution may be safely left in the tissues or peritoneal cavity. In cases showing spreading inflammatory conditions, it is well to inject the antiseptic into the part and especially around the edges with a hypodermic serum syringe.

When the infection has been practically overcome, weaker solutions, *e.g.*, 1 : 5,000, may be used or the treatment may be intermitted for a day every few days, dry dressing being substituted in the intervals, or " stimulating " applications, *e.g.*, Brilliant Green solution 1 in 1,000, may be employed.

Inlet tubes may be used, but frequent periodic flushing, *e.g.*, every two hours, with an aqueous solution (Carrel's method) is to be *avoided.*

Suitable concentration of serum is required to produce the full activity of these antiseptics. Brilliant Green in 1 in 2,000 solution is, however, more powerful than these bodies in aqueous solution, but rapidly inactivated by serum ; the latter has given good results by Carrel's method.

Gauze steeped in the solution is specially favoured as the dressing need only be changed once or twice in 24 hours.

Prophylactic Use before onset of Suppuration.—A contaminated wound, within the first few hours of infliction, if thoroughly cleaned with 1 in 1,000 solution—as much as possible being left in the cavity—may be sewn up and will heal by first intention. The same result may be expected in war wounds if similar facilities are permitted, but on the whole this is not favoured. It is better to pack the wound with the soaked gauze for three or four days after requisite surgical procedure. Suppuration may thus be aborted in many cases. Inject the solution into the surrounding tissues and muscle planes with a syringe and fine needle as previously mentioned, if there is extensive damage to the tissues.

Acriflavine is also advocated at the time of secondary operations to prevent the recrudescence of sepsis when operating in an area already affected.

Intravenous Injection—The preparation has been tried even to the amount of 300 Cc. of 1 in 1,000 solution. The injection is given slowly—at the rate of 50 Cc. per minute. The method has not been largely practised. *Euflavine is preferable.*

Subcutaneous and **Intramuscular** injections of 5 to 10 Cc. of 1 in 1,000 solution have been given.

General Local Use.—Strengths ranging from 0·1%, to 1% are used for the ear, skin (eczema, sycosis, folliculitis, etc.) *v. postea.*

Internal Urinary Antiseptics.

The relatively non-toxic internal urinary antiseptic, active in high dilution in the urine and eliminated in high percentage by the kidney, without injury to the body, does not exist. Some 200 dyes were examined (details in Edn XIX., p. 304).

There is no dye suitable for use either ***by the mouth or intravenously,*** to act as a urinary antiseptic, with the exceptions of ***Proflavine and Acriflavine,*** and these were given in a dose of 10 mgm. per kilo to rabbits.—F. G. Davis, Am. Jl. Med. Sci., Feb., '21, No. 2, p. 251.

Acriflavine Emulsion, 1 to 1,000.

Thoroughly clean and sterilise with spirit a pestle and mortar of ample size. Place 0·1 Gm. Acriflavine in the mortar, thoroughly powder and dissolve in 1 Cc. of Alcohol 90%. The substance may not dissolve entirely. The particles should be made into as fine a condition as possible. Place 1 Gm. of White Wax B.P. in an enamelled saucepan, melt it carefully, and add 99 Cc. of Liquid Paraffin, and heat together to 110 or 120° C., then gradually add this mixture to the Acriflavine in the mortar with continual stirring. This produces an emulsion or suspension of 0·1% strength. Stronger or weaker dilutions may be prepared.—W. H. M.

Another formula.—Acriflavine 0·1, Thymol 0·005, White Wax 4, Liquid Paraffin 76, Water 20. Wounds and tuberculous glands well treated.—T. E. A. Stowell, B.M.J. i./19,244.

The following is also advised: Dissolve Acriflavine 0·5 Gm. in warm boiled Distilled Water 25 Cc.: sterilise Wool Fat 30 Gm. and put in a sterile mortar: add the solution in small portions with stirring, and finally add Liquid Paraffin to 500 Cc.—W. J. Clarke, P.J. ii./32,435.

Oil Solution made by means of Oleic Acid.—S. Le Prescott, P.J. i./32,66.

Applicatio Acriflavine Gt. Orm. H. is similar strength without Thymol.

IMPETIGO CONTAGIOSA.—The 1 in 1,000 Emulsion in Paraffin the most suitable treatment.—A. R. Balmain, L. ii./26,487.

PERINEAL DRESSINGS.—Emulsion in Liquid Paraffin 1 in 1,000 used as a routine dressing in perineorrhaphies. The dressing renewed after each micturition. When operating for the cure of prolapse, with reasonable nursing, the wound will heal by first intention.—M. A. Dobbin Crawford, L. ii./29,980; B.M.J. i./30,822.

As protective perineal dressing. Acriflavine 1½ grains, Liquid Paraffin 2½ ounces, White Wax 40 grains, Distilled Water 5 drachms.—E. M. R. Fraser, B.M.J. ii./30,1066.

Aquaflavine Soap Paste prepared by neutralising Stearic Acid 1 with Sodium Carbonate 1¼ and incorporating 0·1% Acriflavine, also a Starch Paste or Mucilage with 0·1%.—C. J. Bond, B.M.J. ii./17,6.

Flavine-Starch poultices in the treatment of eczema. 4 tablespoonfuls of Rice Starch and 10 grains (0·6 Gm.) of Acriflavine mixed with cold water; 1 pint of boiling water added, and the mixture boiled till it thickens. When nearly cold pour on to dressing cloth, to form a layer ½ inch thick. When cold and set, cover with a layer of gauze and apply to part. Change 3 or 4 times a day and bathe part at each change with Acriflavine 1 in 1,000 in 0·85% NaCl. Resistant cases of seborrhœic eczema successfully treated by this method.—Jl. Trop. Med., June 1/23,196.

Literature on Acriflavine.

☞ For the original paper advising the therapeutic use of this dye, see C. H. Browning, R. Gulbransen, E. L. Kennaway and L. H. D. Thornton, B.M.J. i./17,73. See also D. Ligat, B.M.J. i./17,78.

Bodo.—A free-living flagellate protozoon. Has been submitted to Acriflavine, in which it grows—normal strains just survive 1 in 5,000. By subcultivation a strain has been obtained which will grow in 1 in 1,500, though not surviving 1 in 1,000. A heritable modification has been impressed on it.—M. Robertson, L. i./30,364. (Bodo caudatus very resistant to gamma rays from Radium.—L. ii./30,418.)

BURNS and pyogenic conditions well treated. No interference with granulation.—C. Bennett, J. W. S. Blacklock and C. H. Browning, B.M.J. ii./22,306.

CONJUNCTIVITIS and gonorrhœal ophthalmia well treated by 'Flavine' 1 in 4,000.—P. Ganguli, Pres., Feb., '21,70.

EPIDEMIC ENCEPHALITIS well treated with intravenous injections of Neutral Acriflavine, 8 consecutive injections of 10 Cc. of a 0·5% solution being given. Injections given slowly at rate of 10 Cc. in 5 minutes.—B.M.J.E. i./26,34.

GANGRENE, MOIST, of arm and leg, and hernia of spleen, well treated with Flavine.—W. J. Sheehan, B.M.J. i./30,822.

GONORRHŒA treated by lavage with 1 in 4,000 Acriflavine—one pint used twice daily.—D. Watson, B.M.J. i./19,571. See also H. E. Gibson, L. i./19,741. Also by 1 in 1,000 Acriflavine with 2% Alkali.—J. Armstrong, B.M.J. ii./19,170. See also W. M. Browdy, Pr., Oct., 1921, and B.M.J. i./23,1080.

Acriflavine intravenously sufficient without any other treatment to cure old-standing cases of gonorrhœa. Usual course 15 injections 5 Cc. 2%.—Per Jl. A.M.A. i./27,211. See also R. D. Herrold and H. Culver, *ibid.*, 460.

In gonorrhœa Acriflavine said to be ideal. It is highly toxic to the gonococcus. 1 in 1,000 used. Solutions to be made with 0·91% Sodium Chloride. May be sterilised without decomposition. Keep in amber bottles. Injections twice a day. Pessaries with Glycogelatin basis 1 in 500 are made.

GONOCOCCAL INFECTIONS OF THE URETHRA.—Intravenous injections of Acriflavine 0·3 Gm. in 100 Cc. Normal Saline, followed at weekly intervals by second and third injections and a week later by 0·4 Gm. in 130 Cc., were of varying activity. A special apparatus for injection is described.—Jl. R.N.M.S., Oct. '25,250.

In gonorrhœa less injury to urethra if Gelatin solution used instead of water or normal saline. Neutral Acriflavine dissolved in water to strength 1 in 4,000, heat to 60° C. and add Gelatin 10% : keep in vacuum flask. One injection daily retained for 8 minutes.—R. D. Herrold and H. Culver, Jl. A.M.A. i./27,459.

INFLUENZA EPIDEMIC.—Acriflavine spray 1 in 1,000 seemed to have some preventive effect.—B.M.J. ii./18,111.

LYMPHANGITIS.—1 in 1,000 hypodermically in Normal Saline of value.

MENINGITIS refractory to serum treatment successfully treated with doses of 5 Cc. 2% solution intravenously.—Per M.A. '31,88.

OPHTHALMIC SURGERY.—Flavine 1 in 4,000 can be safely dropped into the eye twice daily to prevent septic sutures.—Sir A. Lawson, B.M.J. ii./27,1129.

Corneal wounds well treated.—C. Killick, per Pres., Feb., '23,75.

OTORRHŒA.—A few drops of ½% solution in distilled water, of value.—S. N. Consul, I.M.G., Aug., '25,374.

PSORIASIS.—Intravenously 0.1 Gm. in 20 Cc. of water, thrice weekly, well tolerated and of benefit.—Pres., Oct. '31,357.

Puerperal Sepsis.—Prophylaxis in midwifery. One tablet (1·75 grains) in 4 ounces Glycerin, previously heated to 110° C. and cooled, makes a 1 in 1,000 solution for vaginal injection. Non-irritant and highly toxic to pathological bacteria, including the gonococcus.—J. L. Moir, B.M.J. i./31,118. See also under Glycerin.

Intravenously Acriflavine would be worth trying in early cases of puerperal sepsis. Dog experiments, using 1 Cc. of 1% solution per 10 lbs. weight. J. L. Meyer, Am. Jl. Obs. Gyn., 1930; L. i./31,143.

RHEUMATISM.—23 out of 33 cases cured by intravenous injection of 1 Cc. 2% solution of Acriflavine Hydrochloride. Two injections usually gave relief from pain. Phagocytic action. No untoward effects.—Norioka, Jl. A.M.A. i./29,1022.

SKIN AFFECTIONS.—Paint parts with 0·5 to 1% Alcoholic solution. Of value in crusty eczema, pyodermia and impetigo. Four-hourly compresses of 1 in 1,000 solution in pemphigus neonatorum and impetigo contagiosa.

TONSILLITIS.—Paint tonsils daily with 1 in 1,750 solution, previously clearing throat with Hydrogen Peroxide.

TUBERCULOSIS, PULMONARY.—Advanced cases greatly improved following hypodermic injection of a 1 in 1,000 solution of Acriflavine in normal saline, the first dose being 5 minims, increased to 10 minims every 48 hours, and further to 25 minims every fourth day. As much as 40 minims twice a week given.—G. H. Johnson, B.M.J. i./26,567. *See also* R. Aidin, B.M.J. ii./27,217.

Threatened sepsis of knee joint aborted by injection of 30 Cc. of 1 in 1,000 Flavine.—W. H. Hillyer, L. i./18,103.

TUBERCULOSIS.—Neither Acriflavine in doses up to 0·2 Gm., nor Mercurochrome up to 0·005 Gm., had any recognisable effects in the treatment of tuberculous patients. A case of septicæmia, complicating ischio-rectal abscess, which had as a maximum dose 0·01 Gm. of Acriflavine seemed to show definite improvement. 1 Cc. of Acriflavine 1 in 5 has been injected intravenously.—G. R. Gittins, B.M.J. i./27,857.

UNDULANT FEVER.—Cured by intravenous injections, commencing with 0·1 Gm. increased by 0.1 Gm. to 0·5 Gm. at increasing intervals of one, two and three days.—B.M.J.E. ii./29,1.

WOUNDS.—Gauze soaked in 1 in 1,000 solution in Normal Saline, but 1 in 5,000 for subsequent applications is enough. For Carrel's irrigation method 1 in 10,000. The primary dressing need not be changed for two or three days.—H. Drummond and J. W. McNee, L. ii./17,640. See also Sir A. Bowlby, L. ii./17,640.

The Carrel-Dakin process is not of universal application on account of inherent difficulties in technique, but for ease of application, early cleaning of wounds, and abatement of reaction to absorption, the dye is admirable.—E. M. Pilcher and A. J. Hull, B.M.J. i./18,172.

Acriflavine is more potent than Proflavine. 1 in 4,000 thought efficient for a wound infected with *strepto.* or *staphylococci.*—W. Parry Morgan, L. i./18,256.

A film or coagulum liable to form on the surface of wounds—not easy to remove.—M. Pearson, B.M.J. i./18,271.

Sepsis can be prevented by the primary use of Flavine-soaked gauze. Formation of a yellowish pellicle in three or four days is a sign for change to Eusol or Brilliant Green or Magnesium Sulphate.—H. M. Savery, B.M.J. ii./18,283.

Dressings should be applied dripping wet—not wrung out, or the content or strength may be considerably reduced owing to affinity of cotton for the dye.—J. G. Graham, B.M.J. i./28,174.

Untoward results.

Acute toxic hepatitis after Acriflavine *per os*, ½ grain four-hourly per diem for 2 months (10 Gm. in all). Delayed symptoms, with death. Other cases reported of serious effects from intravenous injections in gonorrhœa.—E. R. Cullinan, L. i./31,218.

Average onset of jaundice 112 days after last injection of Acriflavine intravenously.—C. Allan Birch, L. i./31,269.

100,000 tablets issued to 2,500 male patients—danger negligible.—H. M. Hanschell, L. i./31,269.

Regarded as near the ideal antiseptic.—T. Young Simpson, L. i./31,323.

In animal treatment, *e.g.*, throat canker and one eyed cold in pigeons, 1 in 200 solution used as swabbing, efficacious.—Pigeon World, July 16/1920.

✱**Peracrina** (T.M. 443098). A combination of Trypaflavine and an albuminous substance, found to have beneficial action in malaria.—L. i./25,195.

Panflavin Tablets.

Dose.—1 or 2 sucked hourly as influenza prophylactic.

Trypaflavine the active constituent. It is known to be powerful against disease organisms in the mouth. 30 to 50 are said to cure a sore throat. Harmless to children.

Euflavine. *Syn.* NEUTRAL ACRIFLAVINE, DIAMINO - METHYL-ACRIDINE CHLORIDE. $C_{14}H_{14}N_3Cl + H_2O = 277{\cdot}6058$.

Dose.—Internally ½ to 1 grain (**0·03 to 0·06 Gm.**) in tablets 'Enteric coated.'

This substance, being more basic than Acriflavine, is even less irritant to mucous tissues and more suited for use *intravenously.*

Uses and Dosage.—As for Acriflavine. Stronger solutions can be employed. For *local use* to wounds 1 in 1,000 to 1 in 500. For *bladder irrigation and urethral injection* 1 in 4,000 to 1 in 1,000. For skin infections 1% in Alcohol.

Intravenously 1 in 1,000 to 1 in 200 in lymphangitis, enlarged tuberculous glands and threatened sepsis. 50 to 100 Cc. of this has been given. 50 to 100 Cc. of 1 in 200 solution, in rheumatic fever, influenza, pneumonia, endocarditis, puerperal fever, septic abortion, erysipelas, etc.: 1 in 500 to 1 in 100 in gonorrhœa.

Euflavine Tablets 0·87 grain, with Sodium Chloride, make 2 ounces of 1 in 1,000 solution; also 1·75 grains to make 4 ounces of solution.

GONORRHŒA.—Euflavine ½ grain *per os* thrice daily with Oxycyanide of Mercury irrigations 1 in 12,000 to 1 in 8,000, renders the urine clear in the majority of cases within a week.—A. O. Ross, L. ii./30,1206.

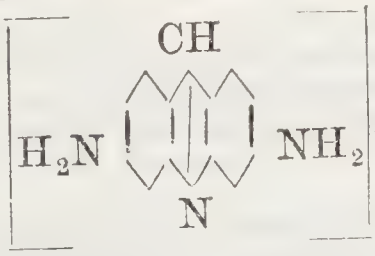
Containing about 1·5% Sodium Chloride as stabiliser, it does not smart like Acriflavine.—P.J. i./23,85,564.

Puerperal septicæmia and pyæmia. 'Flavine' 1 in 1,000 of Saline intravenously as a routine. *Dose.*—10 to 15 Cc. One per diem, but in severe cases, 2 doses.—B. Whitehouse, B.M.J. ii./20,267.

Neutral Acriflavine in concentrations of 1 in 100 to 1 in 1,000 caused survival in guinea-pigs infected with highly virulent diphtheria bacillus. It was 50 times more effectual than Phenol. B.I.P.P. not found effective.—C. H. Browning and R. Gulbransen, B.M.J. i./25,688.

Further references to this compound are given under Acriflavine.

Proflavine.—*Syn.* 3 : 6. – **Diamino acridine sulphate.**



$H_2SO_4 = 516{\cdot}2952$.

This aniline dye precedes Acriflavine in manufacture by several steps—hence it is the cheaper of the two.

PATENT.—The method of making is embodied in the Acriflavine Patents. It was, however, also the subject of Casella's D.R.P. 230412 ("Manufacture of 3 : 6 Diamino-Acridine") British Patent 24652/1910—the latter has now expired.

This Brit. Patent covers the same ground as the two German Patents 230412 and 243085 (Acriflavine).

For a description of the process see our Edn. XVIII., p. 318, *dealing with Benda's paper* (*Ber.*, 1912, *p.* 1787).

Chemical Note.—Though a diamine, this body, as will be seen by the formula, unctionates as a mono-acidic base. Titration shows one molecule of H_2SO_4 to wo of base.

(Samples of Proflavine of commerce which we have examined have been the HYDROCHLORIDE *of the formula $C_{13}H_{11}N_3.HCl$.* NOT *the sulphate.)*

It is in the form of a coarse brown powder. The concentrated aqueous solution is brown. It stains the skin yellow similar to Acriflavine. Dilute solution is also light yellow with fluorescence.

Solubility.—In water 1 in 140, in Alcohol 90% 1 in 48, in glycerin 1 in 10 or less, insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—(by our experiments, 1917).

Compatible with Normal Saline Solution as distinct from Acriflavine (*q.v.*).

Antiseptic Powers.—This compound resembles Acriflavine in being strongly bactericidal for all the common pathogenic bacteria. As weak a solution of Proflavine as 1 : 200,000, it is stated, will kill *staphylococcus aureus* in the presence of serum.

The general toxicity of Proflavine for mice as tested by subcutaneous injection, and the irritating effect of concentrated solutions on the conjunctiva, are markedly less than those of Acriflavine. They may be supplied to the peritoneum with safety.—C. H. Browning and co-workers.

Uses.—Similar to those of Acriflavine, but it is stated to differ in that it exerts a degree of hæmostatic action.

Proflavine Tablets.—0·87 grain (with Sodium Chloride) make 2 ounces of 1 in 1,000 solution ; also 1·75 grains with Sodium Chloride to produce 4 ounces of solution.

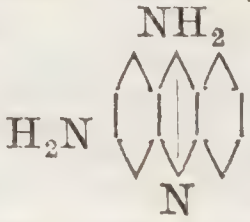
Proflavine Bougies. Contain ½ grain (**0·03 Gm.**) in Theobroma Oil basis ; 4 inches long.

Lotio Proflavine (Pro Oculis).

Proflavine 1 grain in 10 ounces.

In ophthalmic surgery useful. 1 in 1,000 non-irritating, but 1 in 4,000 is strong enough.

***Rivanol** (T.M. 451097). *Syn.* ETHOXY-DIAMINO-ACRIDINE LACTATE.



A yellow dyestuff soluble about 1 in 15 of water. Used in 1% or 2% solution as a local antispetic for abscesses, furunculosis, and the like. Injections need the addition of Novocain (¼ to ½%).

The dye has powerful antiseptic action. Recommended in acute and chronic conjunctivitis.—W. Rumbaur, M.m.W., June 19, '25,1031, per Pres. Feb., '24,62.

AMŒBIC DYSENTERY.—Given rectally 1 in 2,000 irritating : 1 in 10,000 has no lethal effect on entamœba. No marked lethal action given *per os*, but may relieve colic and tenesmus.—Prof. Biggam and M. A. Arafa, L. i./30,1335.

PUERPERAL SEPSIS treated by 0·1 Gm. in 100 Cc. water, with 0·3 Gm. of Sugar added, intravenously. 60 to 80 Cc. given. A second injection may be needed. Drop in temperature caused and general condition improved.—G. H. Morrison, L. i./31,217.

The sterilising concentration of Acriflavine *in vitro* is lower than that required by Rivanol.—C. H. Browning and R. Gulbransen, Jl. Pharm. & Exp. Therap., Oct., '28,194.

Tetrophan. *Syn.* DI-HYDRONAPHTHO-ACRIDINE CARBONIC ACID.

Dose.—¾ grain (**0·05 Gm.**) twice daily, increasing to 1½ grains (**0·1 Gm.**) twice daily if well tolerated.

In tabes dorsalis, pseudo-tabes, and various other nerve affections.

Nomenclature and formulæ of medicinal dyestuffs.—G. M. Dyson, P.J. i./26,101.

Aniline. *Syn.* MONO-PHENYLAMINE, ANILINE OIL. $C_6H_5NH_2 = 93·0626$.

A colorless (when freshly distilled) oily liquid, with Sp. Gr. 1·027. Of burning taste, soluble in alcohol and oils, slightly in water.

Antidotes.—Fresh air, emetics, alkaline salt (NaCl) solution, sodium sulphate, artificial respiration, oxygen, transfusion.

Has a direct effect on the heart muscle, producing arrhythmia and heart-block.

The following solvents are permitted:—Alcohol, Acetone, Furfural, Orthodichlorbenzene.—Jl. A.M.A. i./29,1471.

Poisoning by a boy drinking less than 2 Cc. of a water and aniline mixture. Final recovery under Oxygen given through a Nitrous Oxide bag for 5 minutes at a time with intervals of 15 minutes, instead of constantly through a funnel —far better this way.—J. Inkster, L. ii./26,752.

Poisoning by Aniline and Nitrobenzene. A particular shoe dye containing Aniline caused five cases of poisoning in America, and even the Aniline laundry-mark on diapers has produced effects in infants.—L. ii./25,262.

Aniline intoxication may be produced either by absorption *per os* or through the skin, and in its acute stage cardiac and not respiratory treatment is indicated. Methods of detection in blood and urine.—Jl. Ph. & Exp. Ther., Mar., '26,101, *et seq.*

The term 'Aniline poisoning' is intended, when considering industrial poisoning, to include the hæmolytic action of red blood cells, to which the term 'Anilism' has been given.—L. ii./27,289.

The use of shoe-polishes containing poisonous substances, *e.g.*, Nitro-benzene or Nitro-aniline, prohibited by the Chicago Dept. of Health, March 3, 1927.

Tetryl. *Syn.* TETRA-NITRO-METHYL-ANILINE. An explosive; causes dermatitis amongst workers. Use fomentation and Calamine lotion and Zinc and Castor Oil Ointment. Lead lotion to be avoided; Lead has a dangerous affinity for Tetryl.

Note.—Claessen (Fr. Pat. 355695, 1905) proposed this body and the Ethyl analogue as detonating explosives. Will (U.S. Pat. 827768, 1906) uses the same compound mixed with Mercury Fulminate.—Thorpe, *Vol. II.*, p. 467.

Aniline Sulphate. $(C_6H_5NH_2)_2H_2SO_4=284{\cdot}2008$. *Dose.*—$\frac{1}{2}$ to 3 grains (**0·03 to 0·2 Gm.**).

Has been used for emphysema and asthma; must be used cautiously, as it may cause cyanosis.

Paraphenylenediamine. $C_6H_4(NH_2)_2=108{\cdot}0824$.

Prepared by nitrating Acetanilide and subsequent reduction with Tin and Hydrochloric Acid. In white or reddish crystals soluble in water, Alcohol and Chloroform.—M.pt. 140° C.

For use as hair dye, apply first a solution 2% with 1·5% Sodium Hydrate, then an oxidising agent, *e.g.*, 5% Ferric Chloride to give brown or 3% H_2O_2 to produce a black shade. May produce skin eruptions, eczema, etc., nausea or nervous symptoms, sleeplessness, dizziness, weakness, etc., or impairment of vision.—B.M.J. ii./09,812; P.J. ii./09,535. Should prohibit sale.—L. i./10,66.

Hair Dyes.—***Before applying,*** the sebum must be removed. ***1% approx. of Ammonia*** is said to be safe, but 10% injurious. **Lead Dyes** (*e.g.*, Lead Acetate and Sodium Thiosulphate) are ***dangerous,*** as also are Silver, *e.g.*, Pyro, Amidol and Silver Nitrate. Pure **Henna dye** is harmless, though penetrating the cortex, as also Henna-reng (Henna and Indigo). As to the **Paraphenylenediamine group,** toxic effects are both local and general. **Sabouraud-Rousseau's Test** is used as a sensitisation test. The skin over the mastoid process is cleaned with Alcohol and then the dye and its oxidant applied. When dry cover with flexible Collodion. After 24 hours remove Collodion and wash with soap and water. If patient is sensitive a mild reaction will have formed. If dermatitis is caused in use as hair dye, or from furs, a simple Calamine Lotion containing 2% Ichthyol should be used. *Do not attempt* to *remove the dye by Hydrogen Peroxide or Thio.*—R. M. B. Mackenna, B.M.J. i./30,899. See also further abstract under Cosmetics, our p. 448. Some of these trenchant remarks are criticised by A. Mahony-Jones, *ibid.*, 979.

Hair dyes and their application.—L. i./29,1072.

The only cure, when ladies are affected by skin eruptions from use of hair dye containing Paraphenylenediamine, is by shaving the head. It is cheaper than Silver Nitrate, hence probable reason of its use by hairdressers.—B.M.J. ii./09,918.

A patent specification says the addition of Sodium Sulphite 1 to 1 renders the compound harmless.—P.J. i./11,804,823.

Mrs. Potter's Walnut Juice Hair Dye is well known to contain Paraphenylenediamine as active ingredient. A case of acute catarrhal eczema of the face and scalp caused by it yielded to the use of Iodine Ointment.

Though toxicity has been reduced by converting Paraphenylenediamin into Sulphate, idiosyncrasies still occur. Tolylenediamine with Sodium Sulphite occur in 'Primal'—usually non-irritant.—B.M.J.E., Apl. 24/1914.

INECTO LTD., issue a warning on the use of Inecto, which contains Paraphenylenediamine and Resorcin, but this was not sufficient to protect them—later warnings were more complete. Damages £200.—B.M.J. i./22,373. A further case. In spite of proved negligence of user, she was awarded £500 plus a further sum as special damages.—L. i./26,1058.

The œdema of head, neck, tongue, eyelids and face is the first stage, probably due to a change in the composition of the blood.—O. S. Gibbs, per P.J. i./23,233.

Œdema in animals prevented by large repeated doses of Strychnine and other substances increasing Adrenalin output.—Jl. Ph. & Exp. Ther., Apl. '26,228.

Hair dyes with a base of Paraphenylenediamine are so noxious that nearly every European country, in addition to New York, forbids them.—L. ii./27,824.

The Victoria Pharmacy Board (Australia) has added Paraphenylenediamine and similar irritant bases, preparations and admixtures to Part II. of the Second Schedule of the Poisons Act.—P.J. i./27,373.

Dyed Furs.—Fur workers and wearers of dyed fur are liable to be affected with dermatitis from this substance. Investigations show that Paraphenylenediamine is almost the only dye used, since it has the advantage of being used cold. The fur is dipped in a 0·5% solution and then into Hydrogen Peroxide, when "Bandrowski's Base" is formed. The fur is then washed in revolving drums. Complete removal of all unoxidised amine should be made compulsory.—Y.B.P., '24,524. *See also* Metaphenylenediamine.

Labyrinthine deafness caused by dyed fur.—E. Watson-Williams, L. i./28, 1123.

Fox fur hairs with their springy surface may be more irritant to a sensitive skin than the smoother rabbit hairs. **Naphthaline,** or perhaps **Camphor,** etc., used in storage to keep moth away may also be a factor—there are others, if the matter is a Court case (consult original paper). **Paraphenylenediamine is thought to be the worst. Pyrogallic Acid** thought to be relatively harmless to handle (as in photography). In using Paraphenylenediamine the unoxidised bases, and the partly oxidised are the dangerous bodies. They are generally present only in traces. A well-dyed fur yields a colourless extractive with Petrol Spirit and acid. In doing colour tests use various dilutions of reagents, avoiding using them too strong. **Indamine reaction** shows Para-diamines. Oxidise with cold dilute $K_2Cr_2O_7$ in presence of Aniline Hydrochloride: blue, turning pink on boiling. Dilute Sodium Nitrite, added to a cold acidified dye extract, gives yellowish brown with Metaphenylenediamine, fugitive brown with Para-, orange with Metatoluylenediamine, faint yellow with Para-aminophenol, red with 2 : 4 diaminophenol and Paraminodiphenylamine, and faint yellow with Metol and Hydroquinone.—Further colorations see.—P. Bean, P.J. ii./30,640.

Paraphenylenediamine thought to be the sole cause of dermatitis from furs, but strictly speaking not an irritant: the dermatitis depends on an allergic state of the skin and is idiosyncratic.—G. H. Percival, L. ii./31,423.

Metaphenylene-diamine Hydrochloride. *Syn.* META-DIAMIDO-BENZOL HYDROCHLORIDE. **Lentine.** $C_6H_4(NH_2)_2.HCl$. *Dose.*—$\frac{1}{6}$ grain once or several times daily. In acute diarrhœa. Adult dose 1½ grain to 3 grains thrice daily. The urine becomes dark coloured.—Gehe, see also Brickdale.

This compound, traced in fur, considered more poisonous than the para. The fur cut away from the leather yields nil to distilled water, but dilute saline, alkalis, acids and wool fat (if digested some hours), extracted a coloured principle which agreed with metaphenylene-diamine.—H. Skinner quoted by H. C. Semon, B.M.J. i./23,613.

Materials used in dyeing furs are Amino-derivatives of Benzene, Naphthalene, etc. Others are Benzene-derivatives containing Amino- and Oxy-groups. Paraphenylene-diamine is known as 'URSOL.' In its oxidation Chinondichlordi-imine, which is very irritating, is formed. Pyrogallol, and a number of other dyes are used to produce different shades.—B.M.J. i./23,535.

Dermatitis from dyed fur. "Dyed coney" is probably rabbit—probably paraphenylenediamine employed.—H. C. Semon, B.M.J. i./23,467.

METOL poisoning due to the presence of the Methyl derivative of Paraphenylenediamine. Victims of poisoning by phenylenediamines are warned against the use of soap which aggravates the dermatitis. Acetic Acid 50% is advocated as a detergent, and for the relief of the itching bathing the parts in cold water is recommended.—Brit. Jl. Photog., April 13/23,218, per P.J. i./23,386; P.J. i./25,126. See also L. i./26,417, and our Therapeutic Index.

Orthotoluidine.—$C_6H_4CH_3NH_2$=107·0782.

A colourless liquid turning brown on exposure to air and light and otherwise closely resembling Aniline. Sp. Gr. 1·0037, B.pt. 199° C. *Soluble* 1 in about 70 of water.

Does not appear to have been used therapeutically.

Acidum Sulphanilicum. $C_6H_4NH_2SO_3H$, $2H_2O$ (1 : 4) = 209·1558.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

In small white crystals, slightly soluble in water. Used in Ehrlich's Diazo Test, now deleted from this work. Iodism has been treated by 15 grain doses daily of the Acid in 7 ounces of water.

It is analgesic, and is best given as—

Sodii Sulphanilas. $C_6H_4NH_2SO_3Na$, $2H_2O$=231·143.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

In white shining scales, easily soluble in water. Useful in acute catarrh, laryngitis, and otitis. Said to convert the harmful nitrites in saliva and nasal mucus into innocuous diazo bodies.

Ferri Sulphanilas. $(C_6H_4.NH_2.SO_3)_3Fe$=572·1844.

Iron Sulphanilate is not now used medicinally to any extent.

Zinci Sulphanilas. *Syn.* ✱NIZIN. (T.M. 287163).

$(C_6H_4NH_2.SO_3)_2Zn.$=409·6096.

White crystals soluble 1 in 7 water, 1 in 250 Alcohol 90% (by our experiments). Solutions 1 in 500 to 1 in 250 are injected in the acute stage of gonorrhœa. In atrophic rhinitis the nasal fossæ may be packed with gauze dipped in 1 to 2% solution.

Phenyl Hydrazine Hydrochloride. $C_6H_5.NH.NH_2.HCl$=144·5432.

Dose.—1½ grains (**0·1 Gm.**) given three times daily. Each Gm. of Phenylhydrazine destroys on an average 6 Gm. of hæmoglobin.

Colorless shining scales, readily soluble in water. *Handle carefully, may produce eczema.*

Phenylhydrazine has a specific effect in destroying erythrocytes. There is a marked reduction in blood volume directly proportional to destruction of the erythrocytes and when anæmia has been produced a relative increase in plasma volume is noted.

Discontinue the drug when the erythrocyte count drops to 4,500,000 per c.mm.—B.M.J.E. ii./26,66.

POLYCYTHÆMIA VERA. It was originally given subcutaneously to stimulate the destruction of erythrocytes, but later it was found that use *per os* would do equally well. Two cases, under 1½ grains thrice daily to 3 grains twice daily, proved its capability of destroying red cells. It can apparently call forth a leucocytosis, but must be used with care.—W. Mackay, L. i./29,762.

Has its dangers but is effective. Spleen extract less dangerous, but not known whether equally effective.—L. i./29,1315.

The erythrocyte count may be kept near normal by 0·1 Gm. daily to a tota of 2·1 Gm., when the drug may be safely discontinued for 1½ months. I this dosage there is no deleterious effect on the liver.—C. L. Stealy, Jl. A.M.A i./28,1289.

In advanced polycethemia vera, should not be given, and only wit extreme caution to those over 60, patients with marked arteriosclerosis, o advanced visceral injury. Such patients should be given only small doses 0·1 or 0·2 Gm., and subsequent dosage determined by symptoms. Les advanced cases do well on 0·1 to 0·3 Gm· weekly and the effect observed ove several days. Patients who have had thrombosis should be treated cautiously Ambulatory treatment best, every effort being made to keep circulation a free as possible. Frequent counts of red and white cells and estimations o serum bilirubin needed. As its action continues after withdrawal, it shoulc be stopped before red cell count is normal. Marked rise in bilirubin mean excessive blood destruction, and rising leucocyte count indicates great destruc tion of liver cells. Results transitory and merely palliative.—H. Z. Giffin and H. M. Connor, Jl. A.M.A. i./29,1507 ; Hurwitz and Levitus, Jl. A.M.A i./29,1629.

Acetyl-Phenylhydrazin. *Syn.* PYRODIN, HYDRACETIN, $C_6H_5.HN.NH(C_2H_3O$ =150·094. Colourless crystals slightly soluble in water, has also been used.

Slipules of Phenylhydrazine and Acetyl-Phenylhydrazine 1½ grain (0·1 Gm.) are made.

Phenylhydrazine for the Osazone Reaction for Glucose, see Vol. II.

✱**Pyridium.** (T.M. 487395.) *Syn.* MALLOPHENE. PHENYL-AZO-ALPHA-ALPHA DIAMINO-PYRIDINE HYDROCHLORIDE.

Dose.—1½ grains (0·1 Gm.) in tablet. In hyperacidity dose should be regu lated and given immediately *after* meals.

A red, microcrystalline powder, slightly soluble in water, readily soluble in hot water. It possesses anti-bacterial action against cocci and *B. Coli* and is eliminated through the genito-urinary tract.

Uses.—Gonorrhœal infections in the male and female, *B. Coli* and mixed infections, pyelitis and cystitis. Also used locally as antiseptic.

Contraindications.—Some may display an idiosyncrasy towards the compound when given internally, causing colic, nausea, headache and vertigo : reduced dosage may however establish tolerance, but if not discontinue. Kidney disease is a contra-indication, and it should not be given in severe hepatitis, where excretion is slow, nor in uræmia. Use with caution in severe chronic gastro-intestinal disorders.

The compound should not be used simultaneously with Mercurial irrigations

Anthrarobin. $C_6H_4C(OH)CH.C_6H_2(OH)_2$=226·078.

A light brownish powder, darkening with age, obtained from alizarin by reduction. A powerful deoxidising agent, soluble in weak alkaline solutions. 10% ointment in psoriasis, etc.

Benzol. FR. CX.—' Benzine.' (Avoid this way of spelling.—W.H.M.) *Syn.* BENZENE (*B.P.* '14). C_6H_6=78·0468.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), in capsule or oily solution.

A mixture of homologous hydrocarbons obtained from light coal tar oil. Sp. Gr. 0·880 to 0·887.

Antidotes.—See Poisons and Antidotes.

When swallowed it usually produces a sensation of burning in the stomach. It is a narcotic which, when swallowed or inhaled, produces vertigo, delirium and tonic convulsions, followed by deep sleep ; 30 Cc. has proved fatal.

Uses.—For cough, and whooping-cough, and in influenza. It quickly destroys pediculi capitis or pubis, applied freely ; one application sufficient.—For seborrhœa, should be brushed on the skin.

It has also been extensively tried *per os* in leukæmia.

It has preservative action on organic matter.

Distinguish from **Petroleum Benzine** or **Benzoline,** obtained in the fractionation of the hydrocarbons in Shale. Petroleum Ether and Petroleum Benzine are used ***for heating cauteries*** for nævi, etc. ***Benzol is not suitable*** for this purpose—it burns with a smoky flame. It is, however, better for removing grease stains.

A test for it is to drop into a sample a few grains of Dragon's Blood. If the genuine article it is at once coloured; if it be the Petroleum article, scarcely any effect.

Michael Faraday discovered the body in the liquid of coal gas cylinders (as then used) calling it Bicarburet of Hydrogen $C_{12}H_6$. It was renamed Benzole by him and Benzine by the French (who still adhere to the term—*vide* FR. CX.). Benzole would be the best name for this body (' ol ' being retained for Alcohols) Benzine, or better BENZIN, being kept for the petroleum distillate.

Benzol Capsules contain 5, 10 and 15 minims diluted with ½ volume of Olive Oil, also Benzol ' **Formagules** ' same strength.

LEUKÆMIA has been treated by large doses, *e.g.*, 3 to 4 Gm. (45 to 60 minims approx.). Give small doses at first and note effects.

A case of spleno-medullary leukæmia treated with doses ranging from 30 to 90 minims daily markedly improved. White cells dropped from 133,000 to 7,100 with corresponding increase in red from 2,400,000 to 4,175,000 also increase in Hæmoglobin from 40% to 75%. Nodular lympathic leukæmia treated with similar results but terminated fatally, likewise a case of lymphosarcoma. The question arises as to whether the improvement is permanent.—T. G. Moorhead, B.M.J. i./15,410.

We know of a case improved by 15 m. Capsules. As much as 2 drachms *per diem* of Benzol were taken.

Benzol poisoning as an industrial hazard.—L. ii./26,558. Chronic Benzol poisoning takes the form of aplastic anæmia when small quantities of Benzol are inhaled over a prolonged period.—L. ii./27,289.

National Association's Specification for Motors. Sp. Gr. 0·885. Sulphur not exceeding 0·4%. Distillation tests.—B.M.J. i./19,251.

Benzoyl Chloride. $C_6H_5.COCl$ = 140·496. Prepared from Phosphorus Pentachloride and Benzoic Acid. Distils between 190° C., and 200° C., Sp. Gr. 1·218. Distinguish from **Monochlorbenzene** (*Syn.* **Benzol Chloride**), C_6H_5Cl = 112·496, Sp. Gr, 1·106, B.pt. 132° C., and **Benzyl Chloride** $C_6H_5CH_2Cl$ = 126·5116. Sp. Gr. 1·106, B.pt. 178° C.; also **Benzal Chloride,** *Syn.* **Benzylidene Chloride** or **Benzyl Dichloride,** $C_6H_5CHCl_2$ = 160·9608, Sp. Gr. 1·288, B.pt. 206° C.

Benzyl and Benzylidene Chloride and homologues and substitution compounds, Patent 134,250, see J.C.S.A. i./20,21.

Para-dichlor-benzol ($C_6H_4Cl_2$=146·9452) 92%, Soap 3%, Paraffin Wax 3%, Cedar Wood Oil 2%, for wood-beetle killing. Used in Westminster Hall. —From the " Times."

Paradichlorbenzol, sold as Globol or Chloryl, when vaporised, is effective for killing lice in clothing.—P.J. ii./26,715.

Moles can be banished effectively by a teaspoonful placed in the runs at 6 to 8 feet intervals.

Ortho-dichlor-benzol has also been used as wood preservative.

Anocide.—A preparation containing the ortho compound for killing wood-beetles.

Nitrobenzol $C_6H_5NO_2$=123·047, ' Oil of Mirbane,' has an odour similar to Benzaldehyde, and is used in cheap perfumery; it is a dangerous poison if used in sweetmeats.

Copper sulphate given as emetic; further treatment: Calomel and Bismuth. Fatal dose is about 1 Gm. Poisoning by—placed on cotton wool for tooth-ache. Recovery under 0·2 Gm. Caffeine hypodermically.—B.M.J. i./12,183.

Fatal case.—D. R. Thomas, I.M.G., May, '26,229

Antidote.—Strychnine hypodermically and stimulants.

Nitrobenzol can be reduced electrolytically to **Azoxybenzol** $C_6H_5N:O:NC_6H_5$ = 218·094; **Azobenzol** $C_6H_5N:N.C_6H_5$ = 192·094; **Hydrazobenzol,** $C_6H_5NH.NHC_6H_5$ = 194·1096; and Aniline $C_6H_5NH_2$. Preferable to chemical means.—P.J. i./16,3.

Dinitrobenzol, $C_6H_4(NO_2)_2$=168·0472. The *meta* compound is formed by treating Benzol with a mixture of equal vols. fuming Nitric Acid and Concentrated Sulphuric Acid, and has melting point 90° C. The *ortho-* body has melting point 117° C. *Para-*, 172° C.

Trinitrobenzol, $C_6H_3(NO_2)_3(1:3:5)$ = 213·0474. Crystalline leaflets melting at 121° C.

Manufacture.—Heat Meta-dinitrobenzol 60 with fuming sulphuric acid 1,000 and Nitric Acid (Sp. Gr. 1·52) 500, for a day at 100° C. and for 4 days at 110° C. The yield depends a good deal on the length of heating and other conditions. We found this method (Beilstein Erg. 3 Aufl. ii. p. 49) to work better than that given in Watts. The Trinitro body is separated by pouring the reaction mixture into water (5 or 6 vols.).

Benzyl Alcohol. *Syn.* PHENMETHYLOL. $C_6H_5.CH_2.OH$=168·0874.

Dose.—5 to 40 minims (**0·3 to 2·5 Cc.**) in water three or four times a day.

A liquid with a slight aromatic odour.

Is a satisfactory local anæsthetic, preferably mixed with Chloroform. A few drops on an exposed nerve or cavity is an efficient anodyne for toothache. It is 40 times less toxic than Cocaine.

In common with the other Benzyl derivatives this parent Alcohol was found by Macht to be useful in excessive intestinal peristalsis, pylorospasm, and conditions of the nature of persistent hiccough, as also in whooping-cough. It is stated that the addition of 1% to 5% of Benzaldehyde improves efficacy.—C. & D. Nov. 1920, 1629.

Jacobson's Solution. *Syn.* "Benzyl-Cinnamic Ester" so called.

A solution of **Ethyl Cinnamate,** $C_9H_7O_2.C_2H_5$, in Benzyl Alcohol and Olive Oil.

Dose.—0·25 to 1 Cc. intramuscularly in the gluteal muscles.

In tuberculosis, both glandular and pulmonary. Dose from 0·25 Cc. of the solution.

Improvement in all cases. 0·25 Cc. intramuscularly daily for 12 days, followed by rest of 15 days, and after three series a rest of 1 month.—H. Gainsborough, L. i./28,906, and with P.J. Joy, L. i./29, 1142. In 'external' and general tuberculosis.—L. i./29,320.

Contraindication.—Nephritis.

Benzyl Benzoate. *Syn.* ✱**Spasmodin** (T.M. 398016). (✱Spasmodine is T.M. 397417). Ester Bencil-benzoico, Peruscabina, F.E. VIII. $C_6H_5CO.O.C_7H_7$=212·0836.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**) of 1 in 5 Alcoholic Solution in water or as *emulsion, vide* below.

A liquid with aromatic odour, Sp. Gr. 1·1 as occurring in commerce.

White crystals melting at 20° C. (Fluid at 19° C.). The preparation of commerce is physiologically pure, but cannot be guaranteed 100% —the difference would be Benzyl Alcohol.

Manufacture.—From Benzyl Alcohol and Benzoyl Chloride (Kraut, Ann. 152,130). Also by heating Benzaldehyde at 100° several days with a small quantity of Sodium Benzylate.

The following has been stated to give a yield of 70 to 75% of theory :—

A mixture of finely powdered, desiccated sodium benzoate and a slight excess of benzyl chloride is heated on an oil bath at 170° to 175° for about 24 hours, the mass being frequently stirred. The mixture is allowed to cool, whereupon it is first shaken up with water and then sufficient sodium carbonate added to produce an alkaline reaction. The benzyl benzoate, which separates as an oily liquid, is removed by decantation and distilled *in vacuo* to remove the excess of benzyl chloride. After rectification the pure product boils at 196°, at a pressure of 25 mm.—C. D., Mar. 31/23, p. 438.

Uses.—It is practically non-toxic and has been used in excessive intestinal peristalis, diarrhœas and dysentery, intestinal biliary and renal colic, spastic constipation, vesical spasm, uterine colic, arterial spasm and bronchial spasm of true asthma. It has antipyretic action. Might be of service in dysmenorrhœa.

Capsules of Benzyl Benzoate contain 3 and 5 minims.

Emulsion of Benzyl Benzoate.

Dose.—½ to 2 drachms (**2 to 8 Cc.**) every two hours as required.

Benzyl Benzoate 1, Mucilage of Acacia 15, Aromatic Elixir to 40.

WHOOPING COUGH is well treated by Benzyl Benzoate.—D. Macht, L. ii./20, 615, but its action is uncertain.—L. i./21,394.

SPASTIC CONSTIPATION. Should be given intramuscularly, *e.g.*, diluted with Olive Oil. Adult dose 20 minims. For children *pro rata* by Young's table.—L. i./21,394.

PERSISTENT HICCOUGH. Highly spoken of. Twenty to 30 drops of the 20% Alcohol Solution, in milk or water.—L. ii./20,512.

LYMPHATIC LEUKÆMIA has been treated with it. It is harmless in comparison with Benzol. *Dose.*—5 drops *t.d.*—Pres., Nov., '19.

Vasodilator action of Benzyl Benzoate and Acetate.—B.M.J.E. ii./26,89.

It was found that Papaverine, which is probably a Tetra-methoxy-benzyl Isoquinoline, had the effect of inhibiting contractions of the ureters and lowering the tonus of plain muscle, whilst the Pyridine Phenanthrene group represented by Morphine was found to stimulate contraction and increase tonicity. Benzyl esters were therefore examined and found to act on smooth muscle of the viscera in a similar way to the first mentioned alkaloid—the benzoate being finally selected for use.

Has low toxicity due to conversion into, and excretion as, Hippuric Acid. No serious case of poisoning in many thousands treated. In addition to antispasmodic properties it has antipyretic effect, and is not narcotic even in large doses.—D. I. Macht and H. P. Leach, Jl. Ph. & Exp. Ther., Mar., '29,295.

Benzyl Acetate. $CH_3CO.O.C_7H_7=150{\cdot}078$.

Oily fluid smelling of pears, made from Benzyl Alcohol, Acetic Acid and Sulphuric Acid or by boiling Benzyl Chloride with Alcoholic Potassium Acetate.

Benzyl Acetyl - Salicylate $C_6H_4O.CH_3CO.COO.C_7H_7=270{\cdot}1092$. appeared to be the most powerful intestinal relaxant of twelve Benzyl Esters tested. They all produced relaxation of the intestinal muscles, lowered blood pressure and depressed respiration similarly to Benzyl Benzoate.—Nielsen and Higgins, Jl. Lab. and Clin. Med. St. Louis, Nov. 1921.

Benzyl Succinate. *Syn.* ✱SPASMINE (T.M. 421401) $C_{18}H_{18}O_4$ $=298{\cdot}1404$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

This is a tasteless crystalline substance. Not nauseating to the stomach. It is employed for conditions similar to those for which the Benzoate has been given. **Esterol-Stearns** is a special brand.

Capsules of Benzyl Succinate 5 grains with **Papaverine Sulphate** ½ grain are prepared for the combined effect of these bodies.

Cinnoxyl Capsules are stated to contain **Benzyl Cinnamate** $C_2H_7O_3.C_7H_7$ =238·1142—a constituent of Balsam of Peru—and Cholesterin.

Benzylcarbinol. *Syn.* β-phenyl-ethylol. $C_6H_5.CH_2.CH_2OH$. **'Rose Oil' or 'Orange Oil.'**

A local anæsthetic thought to be superior to Benzyl Alcohol. Toxicity about the same as that of the latter. It is sufficiently soluble for therapeutic use.—A. M. Hjort & J. T. Eagan, Jl. Pharm. & Exp. Therap., Nov., 1919.

Toluol (Methyl-Benzol) $C_6H_5CH_3$=92·0624 and **Xylol (Dimethyl-Benzol)** $C_6H_4CH_3CH_3$=106·078 have chemical and physical properties allied to Benzol. The 1 : 2 Xylol boils at 141°, 1 : 3 Xylol boils at 139°, 1 : 4 Xylol boils at 138°.

Xylol. *Syn.* **Xylene,** unless otherwise specified, is a mixture of the three modifications. In dose of 5 to 15 minims in capsule rendered less likely to dissolve in the stomach juice than in the intestines; has been employed in respiratory affections and in dyspepsia, and has also been suggested for use in certain skin diseases.

Toluol has a preservative action as Benzol above. **Solvent naphtha,** a mixture of toluol and xylol—obtained in distilling coal-tar—is used as a solvent for indiarubber. (Solvent Naphtha commercially may now be of much higher B.pt. *cf.* Mineral Naphtha.).

Scarlet Colors.

Biebrich Scarlet 'R' Medicinal. *Syn.* *o*-Toluene-azo-*o*-toluene-azo-β-naphthol. $C_7H_7N_2.C_7H_6N_2.C_{10}H_6OH$. A red dye with M. Pt. 184—185° C.

Soluble in oils and fats, insoluble in water.

Uses.—To regenerate skin and to hasten epitheliation. As ointment, 2 to 8% Scarlet has been much employed.

Aurinaria of Scarlet 5% strength are for aural treatment.

Unguentum Scarlet 2 to 8%, in Soft Paraffin, also in Unguentum Lanolini. Prescribers should specify which is desired.

℗**Oleum Scarlet et Atropinæ.**—Corneal ulcers have been treated by a 5% suspension in castor oil containing 1% atropine.—P. J. Hay.

There has been some confusion regarding the nomenclature and constitution of the Scarlet R dyes, and the above *Medicinal* Biebrich should always be specified.

The following Scarlet colours have been similarly employed.

Cerasine Red. *Syn.* BENZENE-AZO-BENZENE-AZO-β-NAPHTHOL.

This is also insoluble in water, moderately in Alcohol, and very soluble in Chloroform and Ether (by our experiments), and has been found quite satisfactory.

Non-Staining Scarlet. *Syn.* *o*-AMINO-AZO-TOLUENE.

Soluble in oils and fats, insoluble in water. Considered by some to be more efficacious than Scarlet R.

'Ordinary' Biebrich Scarlet is the *Sodium salt* of *p*-sulpho-benzene-azo-*o*-sulphobenzene-azo-β-naphthol, soluble in water making an orange-red solution.

INDOLENT ULCERS.—The following dressing applied at least twice daily recommended. Immerse lint for two days in a solution of 20 grains of Biebrich Red in a pint of water with 2% powdered Allantoin. Allow to dry without wringing or artificial heat and then iron out at low temperature. Cut to size and shape of ulcer.—J. M. Barbour, B.M.J. i./28,382.

Further references to Treatment with Scarlet 'R,' see Edn. XIX., p. 313.

Amaranth.—Sodium Salt of *p*-Sulpho-alpha-naphthalene-azo-beta-naphthol-disulphonic acid. Useful for tinting Cold Cream and for foodstuffs.—P.J. i./30,427.

***Pellidol.** (T.M. 342061). *Syn.* DIACETYL-AMINO-AZO-TOLUOL. P.G. VI., P. Svec. X. $CH_3.C_6H_4.N:N.C_6H_3CH_3.N(CO.CH_3)_2$ =309·1722.

Red powder with slight acetous odour. Insoluble in water, soluble in Alcohol, Ether or Chloroform, also in oils, fats, and soft Paraffin ('Vaseline' P.G. VI.).

Used in 2% Vaseline salve—does not stain. Azodermin, the monacetyl derivative and the Aminoazotoluol have also been used for promoting the growth of skin on wounds.

Unguentum Granulin.

A Canadian preparation containing 2% of this dye, does not stain (except on linen), makes a homogeneous ointment, is more effective than 8 to 10% Scarlet Red, and is non-irritating. Promotes epithelial growth. Spread thinly on gauze, oil silk or wax paper.

Bordeaux Bx is the Sodium salt of Xylol-azo-Xylol-azo-Beta-naphthol-Beta-monosulphonic Acid: soluble in water.

Bayer '205.' *Syn.* ***Germanin** (T.M. 446358). This compound is probably a derivative of the type:—

$$\left[(SO_3H)_2.\ OH.\ C_{10}H_4NH.\ CO.\ C_6H_4\ NH.\ CO.\ C_6H_4.\ NH\right]^2 CO$$

Dose.—The injection is made intravenously in dose of 1 Gm. in 10 Cc. of water at a time, but may also be given subcutaneously.

A white powder soluble in water. The solution can be sterilised.

A series of dyes containing Amino-naphthalene-sulphonic Acid was found to have active trypanocidal properties. A single dose of 3 mgr. is stated to produce immunity in a mouse to trypanosomiasis for weeks or months. Therapeutically it has been successful where Antimony, Arsenic and Emetine have failed.

The compound exerts a strong action on *T. brucei*, *T. equinum*, *T. rhodesiense*, *T. gambiense*, but has not the same effect on *T. lewisi* or *T. cruzi*.

From experiments, the ratio of the minimal therapeutic dose to the minimal tolerated dose was found to be 1 : 60. It was possible to give as much as 0·5 Gm. per kilo body weight without causing death of mice (infected with *T. equiperdum*). It would, hence, be safe to assume 0·36 Gm. would be easily tolerated by man. Details of nine cases of trypanosomiasis treated. As much as 12 Gm. within 14 days have been given intravenously. Seven of the cases apparently cured.—G. C. Low and P. Manson-Bahr, L. ii./22,1265.

The dye becomes attached to the proteins in the blood serum; albumin-free 'ultra-filtrate' from the serum was found devoid of the remedy. It is excreted unchanged in the urine.—Leader, L. ii./22,1286.

The best effect seemed to be obtained by giving 3 injections at close intervals, and spacing out the remainder into 1 Gm. doses once a week. *The effects on the kidneys need not be regarded as contraindicating its use.*—P. Manson-Bahr. Records of nine cases of trypanosomiasis in Europeans treated with Bayer '205.'—G. C. Low, B.M.J. i./23,149.

As much as 5 Gm. have been given intravenously in 50 hours to a native.—N. H. Dyce Sharp (West African Med. Service), L. i./23,1026.

If given in smaller doses than 1 to 1·5 Gm. the organisms may lose their susceptibility to the drug.—B.M.J. i./23,36. See also J. W. Stephens and Warrington Yorke, Jl. Trop. Med., Feb. 15/23,65; L. i./26,427.

It has a chemotherapeutic index 1 : 60 (Atoxyl 1 : 2). It is probably a derivative of Naphthylamine-Sulphonic Acid.—Barger, per Pres., Apl., '23,155. See also L. ii./26,28.

Bayer '205' and Atoxyl do not cure trypanosomiasis when it has reached the second stage. 0·05 Gm. intrarachidianly may cause grave accidents and 0·3 Gm. mortal accidents. Cutaneous eruption noticed and renal irritation sometimes ending in nephritis.—per Jl. Trop. Med., Jan. 15, '25,36.

Albuminuria caused may lead to death from uræmia.—L. i./25,892.
Treatment in S. Africa prophylactically encouraging.—L. ii./25,1246.
Cannot yet be considered a cure for late cases.—Tryparsamide almost equal, and easier to work.—A. T. Schofield, B.M.J. i./26,92.
It combines in some way with the trypanosome cell producing a heterogenic antigen capable of stimulating formation of specific antibodies.—Per Jl. Trop. Med., Sept. 15, '26,324.
Emetine better in treatment of animal trypanosomiasis.—Per Jl. Trop. Med., May 1, '26,143.
It may be better for *T. Rhodesiense* than for *T. Gambiense*. Of value where trypanosomes become fast to Arsenic or Antimony.—P. Manson-Bahr, L. i./27, 132.

KALA-AZAR treated with success; dose gradually increased up to 1 Gm.—no ill effect. Mollow's case (1922) in which 0·2 Gm. was disastrous is referred to.—Warrington Yorke, B.M.J. i./23,370. Two fatal cases.—J. T. Duncan and P. H. Manson-Bahr, Trans. Roy. Soc. Trop. Med., Vol. 17, 400. A failure —L. E. Napier, per Jl. Trop. Med., Nov. 15/23,348.

FILARIASIS. Painful local reaction in one case. In another, 2 Gm. gave violent reaction. It causes a sharp initial rise in the number of embryos circulating in the blood, followed by a pronounced temporary fall. No evidence of permanent damage to the kidney.—F. G. Rose, Int. Conf. Trop. Am., '24,257-270.

Though Bayer '205' caused rapid disappearance of the trypanosomes, the ***nephritis,*** and in some cases ***amblyopia*** progressing to complete amaurosis militated against its general employment.—Work of Sleeping Sickness Commission in Portuguese W. Africa in 1923, per T. D. B., Oct., '28, 784.

Bayer '205.'—Given intrathecally, alarming symptoms may follow even small doses.—Per T. D. B., Oct., '28,795.
In sleeping sickness a recent reference. 1 Gm. doses.—L. i./29,1104.

Afridol Violet. Relationship to Bayer 205.—G. M. Dyson, P.J. i./26,103.

"No 309." *Syn.* MORANYL (T.M. 458062) produced in France, has similar properties and trypanocidal action, and is probably identical chemically. According to description the product should be $[C_{10}H_4(SO_3Na)_3NH.CO.C_6H_3.(CH_3)NH.CO.C_6H_4.NH]_2CO$. — C. D. Mar., 29/24,451.

TRYPANOSOMIASIS.—"No. 309" like "205" proved inferior to Arsenics. Peripheral sterilisation easily obtained but of short duration. Causes albuminuria in most cases. Preventive action good: prophylactic action in man not yet proved.—Per Jl. Trop. Med., Sept. 15,'26,344.

SUP. 36.—*Dose.*—1/12 to 1/3 grain (0·005 to 0·02 Gm.) intravenously or intramuscularly. Ampoules contain 0·01 Gm. in 1 Cc. Also issued in bulk 0·1 Gm. in 10 Cc.
The symmetrical UREA OF *p*-BENZOYL-*p*-AMINO-BENZOYL-1-AMINC-8-NAPHTHOL-3-6-SODIUM SULPHONATE.
In acute staphylococcic infections, in non-metallic intoxications, in pulmonary thrombosis and œdema, venous thrombosis and the pernicious vomiting of pregnancy. Its action is thought to depend on "liberation of + charged and conductor-functioning Sodium atoms" from the 6-positions. In the treatment of colds in the head, hay fever, influenza, acute asthma, and other inflammatory conditions of the lungs.

ACUTE PLEURISY, BRONCHITIS, BRONCHO-PNEUMONIA and PNEUMONIA (PNEUMOCOCCAL). 0·01 Gm. should be given on two successive days, and a third dose a few days later if necessary.

URETHRITIS. Fever reduced by injections.—F. Kidd, L. i./29,1094.

ASTHMA. Patients with occasional attacks should be treated by S.U.P.36 or B.N.368.—J. E. R. McDonagh, L. ii./29,271.

INFLUENZA, of value. Influenza dose 0·5 Cc. (=0·005 Gm.) into the gluteus medius muscle, followed by 0·75 Cc. 4 days later if necessary.—R. M. Pearce, B.M.J. ii./29,663.
Influenza. No benefit noted in 50 consecutive cases.—A. H. Douthwaite, B.M.J. ii./29,739.

SEPTIC CONDITIONS, *e.g.*, boils, quinsy, etc. Not superior to other remedies, but invaluable in catarrhal fever.—W. T. Brown, B.M.J. ii./29,785.

SUP. 468.—*Dose.*—1/60 to 1/20 grain (0·001 to 0·003 Gm.) intramuscularly. A similar compound used in septicæmia.

SUM. 36.—*Dose.*—1/30 to 1/6 grain (0·002 to 0·01 Gm.) intramuscularly every 5th day on two or three occasions.

Also allied to SUP. 36, used in infections caused by gram-negative organisms.

In the treatment of gonococcal infections, such as urethritis, vulvitis and ophthalmia : also in very acute cases of gonococcal arthritis.

SUM. 468 is the symmetrical UREA OF META-BENZOYL-META-AMINO-BENZOYL-1-NAPHTHYLAMINE-4-6-8-SODIUM SULPHONATE.

In malaria, piroplasmosis of horses, and trypanosomiasis of dogs. Fourneau's " No. 309 " is allied.—J. E. R. McDonagh, B.M.J. i./25,654 ; i./26,693.

"T.N.T." Tri-nitro-Toluene. *Syn.* **Trotyl,** $C_6H_2CH_3(NO_2)_3$= 227·063. *See Vol. II.*

Trinitro-Butyl-Toluene $C_6HCH_3C_4H_9(NO_2)_3$ is synthetic Musk or Tonquinol.

Chinolinum. *Syn.* QUINOLINE. C_9H_7N=129·0626.

Dose.—3 to 10 minims (**0·2 to 0·6 Cc.**).

A colourless liquid, with peculiar odour, soluble in alcohol, but insoluble in water. Prepared by oxidising a mixture of Aniline and Glycerin with Nitrobenzol (Skraup's Synthesis).

Chinolini Tartras.

$(C_9H_7N)_3,[C_2H_2(OH)_2(COOH)_2]_4$=987·335.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in chloroform water, with Syrup of Orange, or in cachet.

Glistening, white acicular crystals, nauseous in taste, and ***soluble*** about 1 in 80 of water. Antiseptic and antipyretic, *e.g.*, in enteric and intermittent fevers, useful in neuralgia.

Oxyquinoline Sulphate. *Syn.* ✱**Superol.** (T.M. 394351, 412083).

$(C_9H_6N.OH)_2.H_2SO_4$=388·2008.

✱**Chinosol.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

TRADE MARKS : 221896 (Class 2), 221898 (Class 48), 488001 (Class 3), and 220003 (Class 1).

PATENT : No. 1409 of 1896, " An Improved Manufacture of an Antiseptic Disinfectant," granted to the owners of the trade mark. The patent ***expired*** in 1909.—Per C. D., Aug. 1915.

The above patent deals with the ' heating of Oxyquinoline with Potassium Pyrosulphate.'

The substance was originally stated to be Potassium-oxyquinoline Sulphate but the content of Potassium in the original article of commerce does not agree with theory. The substance leaves no ash on incineration.

For notes on Manufacture see 17th Edn. p. 306.

Characters and Uses.—Yellow crystalline powder, M. pt. 175 to 177° C., readily *soluble* in water, sparingly in alcohol. A 2% solution checks surface hæmorrhage and for scalds. 1 in 1,000 for the hands. In chronic eczema 1 in 200 combined with Lotio Calaminæ Oleosa.

Tablets 5, 8 and 15 grains. One of the latter in a pint of water is said to be equal to Phenol 1 in 40, as an antiseptic. **Gauze,** 3% 6 yd. pieces.

Beneficial effects in many mycoses : tricophytic conditions of face, arms, and wrists cured within a week by repeated applications of 1 in 2,000 solution.—B.M.J.E. i./27,49.

Diphtheria carriers treated by insufflation once or twice daily with powder containing 1 to 2% in Bismuth Carbonate.—Per M.A. '31,155.

Cyanine Dyes, Sensitol Red, Violet and **Green, etc.,** used as photographic sensitizers, are extradordinarily active against staphy-

lococci. **Sensitol Green,** an iso-cyanine, is made by condensing quinoline methyl iodide with *p*-tolu-quinaldine methiodide.—C. H. Browning and co-workers. B.M.J. i./22, 514,612.

Cyanine. *Syn.* QUINOLINE BLUE, IODOCYANINE, is usually given the composition $C_{29}H_{35}N_2I$ or $C_{28}H_{35}N_2I$.

Styryl-quinoline derivatives formed by condensation in presence of piperidine of *p*-dimethylamino-benzaldehyde and quaternary salts of Quinaldine and Lepidine. Substances of this group are powerful antiseptics. —C. H. Browning and co-workers, B.M.J. ii./23,326.

Acidum Phenylcinchoninicum, P.G. VI., U.S. X., Ph. Ned. V., P. Bor. VII., P. Svec. X., P. Ital. V., P. Belg. IV., F.E. VIII. *Syn.* ACIDUM PHENYLCHINOLINCARBONICUM P.G.), CINCHOPHENUM. ✱PHENOQUIN (T.M. B. 403738.) ✱ATOPHAN (T.M. 331473)' ✱AGOTAN (T.M. 401393), CINCHOPHEN, NYLOFANOL, ATOCIN, QUINOLINE CARBOXYLIC ACID. $C_6H_5.C_9H_5N.COOH=249{\cdot}0938$.

PATENT 15,684/12, "Improved process for Manufacture." There are others to which reference should be made, *e.g.*, 12,052/12.

Dose.—8 grains (**0·5 Gm.**) four times daily to 15 grains (**1 Gm.**) thrice daily after meals. Simultaneously on the first day, ½ ounce (**15 Gm.**) and on the following days 75 grains to 150 grains (**5 to 10 Gm.**) of Sodium Bicarbonate, but this is not the invariable practice.

Tablets 4 grains (**0·25 Gm.**) —eight to twelve daily, also 8 grains (**0·5 Gm.**)—four to six daily.

A yellowish cream-coloured amorphous powder of the composition 2-Phenylquinoline-4-Carboxylic Acid.

Uses.—Is said to facilitate the elimination of uric acid from the organism in gout and rheumatic affections, also used in neuralgia and sciatica. It may cause cloudiness and red colour in the urine.

Incompatible with Sodium Bicarbonate and other alkalies *in vitro.* We did not find it incompatible with Potassium Iodide.

Increased excretion of Uric Acid confirmed.—Folin and Lyman, Jl. Ph. & Exp. Ther., 1913, 4,539—546) ex J.C.S.A. i./14,115.

With Aspirin given in influenza the combined effect in inducing perspiration said to be better.—See Aspirin.

JAUNDICE OF THE NEW-BORN disappeared in 12 days in 80% of 67 cases treated with 0·1 Gm. daily (with or without 2 Gm. of sugar).—Per Jl. A.M.A. ii./25,860.

CHRONIC GOUT. Often invaluable, and can cure or alleviate symptoms. Test patient with small dose at first. It is generally given on three days in succession each week. When nutrition is poor and there is suspicion of poor Glycogen reserves in the liver, carbohydrate diet should be given. Where symptoms of liver poisoning arise, *e.g.*, loss of appetite, stop the drug at once. —Geoffrey Evans and A. W. Spence, L. i./29,704.

Excretion of Uric Acid.

Large doses of alkalies, Hexamine and Piperazine, which dissolve Uric Acid *in vitro,* do not appreciably alter the excretion. Salicylates increase both formation and elimination. The derivatives of Quinoline Carboxylic Acid notably facilitate excretion, shown by a reduction in blood Uric Acid.—Dixon, p. 100.

Uric Acid the true stimulant for Uric Acid secretion. Atophan ***diminishes secretion.***—O. S. Gibbs, Jl. Ph. & Exp. Ther., Jan.'29,62.

Toxic effects from Atophan. General malaise, headaches, gastro-intestinal disturbance, urticaria, albuminuria and jaundice, the latter did not clear for several weeks.—C. Worster-Drought, B.M.J. i./23,148. See also *ibid.* ii./26,93, and Geoffrey Evans, ii./26,93. (Severe poisoning going on to jaundice and repeated vomiting whether with or without Sodium Bicarbonate.)

Three cases of ***toxic jaundice*** following the administration of Atophan in ordinary doses *per os*. One of these was fatal. Toxic action is probably due to the quinoline nucleus. *Atoquinol* can hardly be regarded as a derivative of Atophan, but both are derivatives of quinoline. Probably toxic effect only where there is defective hepatic function, but possibly there is actual toxic action on the liver.—Sir W. H. Willcox, B.M.J. ii./26,273.

Lumleian Lectures.—The type of toxic jaundice from Quinoline derivatives is dangerous. **Van den Bergh Test** and the **Icterus Index** indicate merely the bile regulating mechanism. The ***Lævulose Test is best.*** Both Atophan and Arsenobenzol effects may be very long delayed.—Sir W. Willcox, B.M.J. i./31,553.

***Gorun Cachets.** (T.M. 496893). A combination of Cinchophen, Hexamine, and Glycocoll. *Intramuscularly* or *per os*, in sciatica, lumbago, etc.

Jaundice has followed taking.—Sir Wm. Willcox, B.M.J. i./31,395.

Forty-seven cases of Cinchophen toxicosis published, with 10 deaths. Evidence of serious injury to liver in all cases. On the appearance of gastric intestinal symptoms, rashes, or icterus, it should be immediately stopped. Its therapeutic use may well be re-evaluated in view of its harmful properties. —H. S. Reichle, Jl. A.M.A. ii./29,951.

Fatal case of poisoning. 45 grains a day for 4 days, with intermission for 2½ months. Death due to acute hepatitis.—W. Morris, B.M.J. i./31,221.

Two cases terminating fatally following continued use (three 7½ grain tablets daily). Intolerance may be indicated by nausea, loss of appetite and albuminuria. Even if used in the correct intermittent manner it may be dangerous. —L. J. A. Lowenthal, W. A. MacKay and E. Cronin Lowe, B.M.J. i./28,592.

'Ung. Agotan Co.'

Agotan with a rubefacient in ointment form, for use in general, articular and muscular rheumatism, gout, lumbago, sciatica, erythema nodosum, torticollis, pleurodynia, neuritis, urticaria and chilblains. The simultaneous use of Agotan tablets *per os* increases results.

Atophan applied externally as ointment gave good results in chronic rheumatism and lumbago.—H. Horsters & H. Rothmann, Med. Klin., Apl. 9/26,582, per Pres., Sept.,'26,315. See also L. ii./29,413.

Magnesium-Phenylcinchoninate is less toxic and a more efficient antipyretic than the Sodium salt, and the addition of Magnesium Chloride in the ratio of 3 to 2 causes marked antipyretic synergism.—H. G. Barbour and J. E. Winter, Jl. Ph. & Exp. Ther., April,'29,434.

***Atophanyl** (T.M. 434667). Contains equal parts of Sodium Atophan and Sodium Salicylate in solution.

For intravenous injection.—10 Cc., containing 7·5 grains of each.

After injection, the arm should be held above the head for 1 to 2 minutes. Warm the ampoules first. The patient should not undertake undue exertion too soon after the pain has been relieved.

For intramuscular injection.—5 Cc., containing 7·5 grains of Sodium Atophan, 7·5 grains Sodium Salicylate, and 0·6 grain Novocain in distilled water. To be given deeply in the upper external quadrant of the gluteal muscle.

Uses.—Rheumatism, osteo-arthritis, and metastatic joint-diseases of various kinds: and otherwise as Atophan.

In chronic cases, 10—15 injections are given; usually one injection per day for 4 days, followed by an interval of 2—3 days.

Various rheumatic conditions benefited by intravenous use.—B.M.J.E. i./26,90.

Atophan intramuscularly or intravenously in cases with a definite rheumatic diathesis is said to give good results in scleritis, iritis, and iridocyclitis: injections daily or twice daily.—B.M.J.E. i./27,12.

***Neo-Phenoquin.** (T.M. B. 403739). LITHIUM PHENYL-CINCHONINATE. $C_6H_5C_9H_5N.COOLi=255{\cdot}026$.

Dose.—From 5 to 15 tablets daily, each tablet containing 0·25 Gm. after meals, followed by a glass of water.

Simultaneous use of Sodium Bicarbonate is sometimes desirable.

Uses.—For elimination of Uric Acid in acute and chronic gout.

Ⓟ***Anotal** (T.M. 510239). A combination of Phenyl-cinchoninic acid and Ethyl Urethane. No reason to believe it causes yellow atrophy of the liver.—B.M.J. i./31,757.

'Iodo-Cinchophen.' *Syn.* FARASTAN.

Stated to be a 'new chemical complex' containing 33% Iodine. In arthritic and neuritic conditions.—Jl.A.M.A. i./30,484,1173.

Methyl Phenylcinchoninate, Methyl Phenylchinolincarbonate P.G .VI. *Syn.* *****NOVATOPHAN (T.M. 344161) (SCHERING). $C_6H_5.C_9H_5N.COOOH_3=263{\cdot}1094$.

Dose.—8 grains (**0·5 Gm.**) four times daily to 15 grains (**1 Gm.**) thrice daily. Simultaneously on first day ½ ounce (**15 Gm.**), and on the following day 75 to 150 grains (**5 to 10 Gm.**), of Sodium Bicarbonate.

This compound is the Methyl ester of Atophan and is used similarly. It occurs as yellowish tasteless crystals insoluble in water.

***Atoquinol.** (T.M. 440681). ALLYL PHENYLCINCHONINATE.

Dose.—4 to 8 tablets in 24 hours [each tablet contains 4 grains (**0·25 Gm.**)]. They should be administered with a large quantity of liquid.

It forms odourless yellowish crystals, m.pt. 30°, insoluble in water, readily soluble in Ether and oils.

Uses.—This Atophan derivative has analgesic and antipyretic properties and is used similarly in arthritis, gout, neuralgia, sciatica, etc.

It may be applied externally in an ointment (20%).

Atoquinol has been shown to stimulate elimination and inhibit production of Uric Acid.—M.P.C., April 16,'24.

If the urine shows a sediment of Uric Acid or urates, it is advisable to prescribe Sodium Bicarbonate as well.

Renal lithiasis is the only known contraindication.

Toxic Jaundice. Two fatal cases following use of Atoquinol in rheumatoid arthritis.—W. Langdon Brown, B.M.J. ii./26,37, see also *ibid.* 93, and Sir W. H. Willcox, *ibid.* 273, and *Atophan—Toxic Effects.*

***Tolysin.** (T.M. 496959.) *Syn.* ETHYL METHYL-PHENYL-CINCHONINATE.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) three or four times daily for four or five days. It may be necessary to give 100 grains daily in rheumatic fever.

A yellowish-white crystalline powder, M.Pt. 74° C.

Uses.—An analgesic, antipyretic, and Uric Acid eliminant. Indicated in gout, rheumatism, rheumatic fever, arthritis, neuralgia, neuritis, and sciatica. It does not depress the heart, or injuriously affect the kidneys. 50 Gm. have been given in 8 days without causing untoward symptoms.

Efficient in acute rheumatic fever, complete relief of symptoms being usually obtained after 10 to 16 Gm. 2 Gm. given every 2 hours for 3 doses, followed by 2 Gm. every 4 hours.—H. G. Barbour, E. Lozinsky & C. Clements, Am. Jl. Med. Sci., May,'23,708. See also P. J. Hanzlik, R. W. Scott and others, Jl. A.M.A., '21,1728.

Efficacy in arthritis.—Chace, Myers and Killian, Jl. A.M.A., Oct.'21,1236.

Advocated for headaches of nephritis.—A. I. Ringer, Am. Jl. Med. Sci., June,'21,814.

In acute rheumatic fever.—C. W. Chapman, Pr., Jan.'24,41.

In rheumatic heart disease Tolysin has definite action, is less toxic than Salicylates, and enables the worst cases of carditis to be treated without fear of drug complications.—F. J. Poynton, L. ii./28,638.

Cinchophen compounds classified.—B.M.J. i./31,387.

Neotropin. *Syn.* 2-Butyloxy-2′-6′-diamino-5·5′-azopyridine. ($C_{14}H_{18}ON_6$). A dye giving yellow coloured solution used as a urinary antiseptic. Functions whether urine is acid or alkaline. More pronounced effect by reducing fluid intake.

Dose.—2 dragées (each 0·1 Gm.) daily for a week, but in prolonged treatment interpose interval of day or so each week. Dose may be increased.—B.M.J. ./31,589.

***Percain** (T.M. 379675). The Hydrochloride of *a*-butyloxycinchoninic acid diethylethylendiamide,



Max. dose advised to be injected, 0·1 Gm. in 0·2% Solution and 0·2 Gm. in 0·05% Solution.—B.M.J. ii./29,1114; i./30,156.

Colourless crystals, M.Pt. 97°. Readily soluble in water and Alcohol with neutral reaction.

A new local anæsthetic effective in a dilution as high as 1 in 1500. Solutions are made in Normal Saline.

Effect greater than of Cocaine, but five times more toxic. Deaths recorded from 0·13 and 0·2 Gm. Has slow rate of elimination and prolonged action. Maximum dose not yet determined, but should not be used in concentrations of more than 0·5 to 1 per 1,000.—B.M.J.E. ii./29,84. See also Use in anal fissure, our p. 350.

It is potent in such high dilution that the content adds next to nothing to the Sp. Gr. of the vehicle. For thoracic nerve root blocks solutions 1 in 2,000 to 1 in 1,000 according to duration of analgesia needed. 7½ to 10 mgr. said to be more effective than 150 mgr. Novocain.—W. Howard Jones, L. i./30,573.

Mucous membranes, especially of the nose, anæsthetised with 1 and 2% solutions, with addition to each 50 Cc. of ½ Cc. Adrenalin solution, for partial resections of turbinals, removal of polypi, ethmoidal curettages, and intranasal drainage of maxillary antrum. The mucous membrane is not permeated, though profoundly affected. It is admitted to be twice as toxic as Cocaine.—O. Popper, B.M.J. i./30,669.

Fatal syncope following Percain. The prone position is an error. Operation for a large ovarian cyst occupying the abdomen up to the costal margin. It should be remembered that the gravid uterus is a similar contraindication. —W. Howard Jones, L. ii./30,550.

Clinical experience with Percain (made by Ciba of Basle). Cheaper than Novocain. 7½ mgr. have longer effect than 150 mgr. of the latter.—N.C. Lake and C. J. Marshall. Often it is not the anæsthetic, but the anæsthetist is responsible for good results in spinal anæsthesia.—C. Donald, B.M.J. i./30, 488,495.

Toxicity negligible. Gives complete relaxation in high abdominal operations.—I. W. Magill, L. i./31,353.

Has far greater toxicity and no great advantage over Novocain-Adrenalin for infiltration anæsthesia but promising for mucous membranes.—M. C. G. Israels and A. D. Macdonald, B.M.J. ii./31,986.

Sodium Iodohydroxy-quinoline Sulphonate. *Syn.* ***Yatren** (T.M. 417770), GRISERIN, LORETIN, ***QUINOXYL** (T.M.485520), CHINIOFON.

Dose.—15 grains (**1 Gm.**) thrice daily.

Manufacture.—From 8-Hydroxyquinoline or the Sulphate (Chinosol) 8-Hydroxyquinoline-5-Sulphonic Acid is prepared by dissolving in Sulphuric

Acid, pouring into water, and allowing to crystallise. On iodising this product, 7-Iodo-8-hydroxy-5-quinoline-sulphonic-acid is formed, which, mixed with 20% of Sodium Bicarbonate, constitutes the preparation. It contains about 28% Iodine and on adding to water the fairly soluble (about 1 in 25) Sodium Sulphonate is obtained.

Uses.—In acute and chronic *amœbic dysentery* 15 grains three or four times daily for a week, repeated on two or three days during two following weeks; or a daily enema of 200 Cc. of 2% solution has been advised.

A dose three times daily for a week, then an interval of 8 or 10 days, and repeat—in resistant cases supplement with nightly lavage for 6 or 8 nights, repeated after 3 to 6 days' interval (during days when lavage suspended, continue treatment *per os*, giving 0·75 to 1 Gm. daily). Lavage should be retained all night if possible. Of value in acute and good in chronic cases; where complicated with liver abscess the intestinal lesion is ameliorated but not the abscess. In amœbic dysentery with lesions high up in the intestines lavage is useless, but oral method of value.—Louis Schwartz, Paris, 1927.

Yatren, by enema, acts rapidly in the acute stage, amœbæ being apparently destroyed in 4 days.—P. H. Manson-Bahr and R. M. Morris, L. ii./25,544.

Advances in treatment with Yatren.—P. Manson-Bahr, B.M.J. ii./27,486-490.

Some favourable reports are tabulated in the Pres., Jan.'27,15.

The action of certain alleged intestinal antiseptics (Yatren, Kerol, Dimol, Izal). Experiments showed '*no evident action whatever in any dilution employed.*'—L. P. Garrod, B.M.J. i./26,367, see also our abst. under Dimol.

In mixed amœbic and bacillary types quite contraindicated *per os*—too irritant.—J. Graham Willmore, T.R.S.M., Nov. '28; G. C. Low, *ibid.*

Yatren-Casein Ampoules for intramuscular and in rare cases intravenous injection are made. 'Weak' 2½% Yatren plus 2½% Casein, 'strong' 2½% Yatren plus 5% Casein. Doses ranging from 1 to 7 Cc. are used in bronchitis, acute articular rheumatism, and eye affections.

Quinanil. *Syn.* '48 S,' A Sulphonated 2 (*p*-Dimethylamino Anil) 6 Methyl Quinoline Methochloride.

Antiseptic power 1 in 500,000. Effected sterilisation of *S. aureus* on addition to 1% Peptone Water. More potent than Acriflavine.

Uses.—(*a*) As a prophylactic antiseptic dressing or pack for accidental wounds, laceration of soft tissue, circumcisions, amputations, skin grafts, and the post-rectal space after operation for prolapse, or excision of rectum. Also (*b*) as a local application for boils, suppurative hæmatomata, fungating growths, etc. And (*c*) and (*d*) as an irrigant; (*e*) as a general urinary diseases irrigant. (*f*) Intravenously in septicæmia with positive blood culture. Results favourable; worthy of extended trial.—G. Armitage and others, L. ii./29, 968.

Fuchsine.—**Rosaniline Mono-Hydrochloride** (principally).

$$\begin{matrix} H_2N.CH_3.C_6H_3 \\ H_2N\,C_6H_4 \end{matrix}\!\!>\!C=C_6H_4=NH_2Cl.$$

Syn. Magenta; Aniline Red, Rubine.

Dose.—½ to 4 grains (**0·03 to 0·25 Gm.**), in a pill.

Iridescent crystals, forming a deep-red solution for staining *B. tuberculosis.*—*Vide* Clinical and Bacteriological Notes, *Vol. II.*

Soluble in alcohol 1 in 8.

Given in renal albuminuria. Must be arsenic-free.

Unguentum Fuchsin 5% in Soft Paraffin. Carbuncle and soft chancre well treated.—L. i./14,1502.

Fuchsin Paint.—*Castellani.*

Epidermophytosis of the toes (Mango toe) and other forms of epidermophytosis well treated with a paint consisting of saturated Alcoholic Solution of Basic Fuchsin 10 Cc., 5% Phenol Solution 100 Cc.

Filter and add Boric Acid 1 Gm., after 2 hours add Acetone 5 Cc., 2 hours later add Resorcin 10 Gm. Keep in dark colored stoppered bottles. Should be employed initially with care and in small amount. —Sir A. Castellani, L. ii./28,596.

Rosaniline (*Syn.* **Roseine**) **Acetate.**

$C_{20}H_{19}N_3 \cdot C_2H_4O_2 + 5H_2O = 451{\cdot}2814$.

Dark red crystals ***soluble*** in water and in alcohol Both these bodies are sometimes called ' Roseine.'

Methyl Violet. *Syn.* **Pyoktanin.** In green crystalline powder, *soluble* 1 in 20 of water, 1 in 20 of alcohol 90%, also in Glycerin 1 in 15, and in Oleic Acid. Insoluble in Liquid Paraffin and Vaseline—by our experiments. Commercial Methyl Violet, the colour used in the manufacture of inks, is a mixture of the tetra-, penta- and hexa-Methyl derivatives of Pararosaniline Hydrochloride. It may be added that there are numerous Methyl Violets, the particular shade depending on the degree of methylation.

Dilute solutions have been injected locally and applied for malignant growths, but Gentian Violet, a purified Methyl Violet, is now generally used. For details of ***antiseptic action*** see under ***Brilliant Green.***

Gentian Violet, Medicinal.

Dose.—0·003 to 0·007 Gm. per kilo [=3 to 7 grains (**0·2 to 0·45 Gm.**) for a 10-stone man] intravenously in a ¼ to 1% aqueous solution.

Chemical Composition.—The product used therapeutically is a purified Methyl Violet, and consists of a mixture of the hydrochlorides of hexa- and penta-methyl-pararosaniline with some tetramethyl-pararosaniline hydrochloride.

Soluble in water, but solutions cannot be made in Normal Saline, as the presence of the electrolyte results in precipitation of the dye.

Adulteration.—For intravenous injection the dye should be free from metals and Dextrin. Gentian Violet of commerce contains, according to the ' COLOR INDEX,' and other authorities, 50% of Dextrin.

Examination.—The dye must be examined for Lead, Copper, Zinc, Iron and Arsenic : we suggest as limit for the last mentioned 1 in 100,000. Dextrin content should not exceed 1%.

Ash we advise should not exceed 0·5 to 1%.

Grübler's Gentian Violet found to consist of about equal parts of Dextrin and dye. Dye was a mixture of chiefly hexa- and penta-methyl-*p*-rosaniline hydrochlorides.—Chem. Absts., 1920,190.

Bactericidal Action.—The dye is stated to be specific for the Gram+ group of organisms only.—Jl. A.M.A., Dec. 29,'23.

Staphylococcic infections only are attacked by Gentian Violet, not streptococcal.—E. L. Walker, Jl. Pharm. & Exp. Therap., XXVI., No. 6, 461.

Uses.—It is employed intravenously in septicæmia and endocarditis. Has been tried in encephalitis.

For *direct application* a solution 1–500 to 1–1000 has been recommended : for instillation 1–10,000, and for *intravenous injection* 5 mgr. per kilo-weight, injected in 0·5% solution.

Gentian Violet proves selective not only between Gram-positive and Gram-negative organisms, but also as between bacteria and tissue cells. Encouraging results have been obtained in acute infections of joints by lavage and direct medication.

In the dyes showing the greatest inhibitory action, the Hydrogen atoms in the amino groups are all substituted with alkyl radicals ; usually this alkyl radical is the methyl group. Acid dyes or salts of acid or basic dyes are inert. The substitution of a hydroxyl radical for a methyl group decreases the inhibitory power. If two dyes of opposite selective powers be mixed, the mixture combines the power of both, *e.g.*, Gentian Violet and Aciflavine, act respectively on Gram-positive and Gram-negative organisms, while a mixture of the two is bacteriostatic for both.—Pres. June, '24/240.

EMPYEMA, POST-INFLUENZAL.—Aspiration and intrapleural instillation of Gentian Violet in concentrations of 1 in 10,000 to 1 in 1,000 were used in treatment. Of 27 cases, 14 recovered without operation.—A.J.Med.Sci. 162/21,397. Chem. Absts.,'22,591.

ENCEPHALITIS. Three cases recovery : also one of CHOREA.—Per Jl. A.M.A. ii./25,1670.

ENDOCARDITIS.—Review of literature (entirely American) on the subject of intravenous injections of the dye. Details of 7 cases of rheumatic carditis so treated, all children, varying from 5 to 13 years. Dose, 25 to 50 Cc. of a 0·25% aqueous solution (i.e., 0·005 Gm. per kilo). Injections given at weekly intervals. Definitely toxic effects occurred in the case of a 5-year old child. Of 10 cases, 8 were definitely improved. With caution as to dose and type of case, the method is safe and worth further trial in the treatment of blood infections.—William Gunn, L. i./27,127.

Subacute infective endocarditis. Good result with 1 in 500 aqueous solution.—R. H. Major, B.M.J.E. i./25,38.

Malignant endocarditis treated: disappointing. 1% aqueous solution used. Except for intense cyanosis of short duration, no untoward symptoms produced.—Jl. A.M.A., Nov. 13/26,1677.

PERNICIOUS ANÆMIA.—Gentian Violet *per os*, 5 to 50 Cc. of a 1 in 1,000 solution after meals, or in 1 to 2½ grain capsules or tablets, gave a rise in hemoglobin content and in erythrocyte count, and in some cases amelioration of symptoms. Vomiting, nausea, or diarrhœa may be caused.—Med. Jl. & Rec., '27,9, per Pres., June, '27,225.

SKIN. Infectious eczematoid dermatitis, impetigo, folliculitis and furunculosis. A 5% solution in water containing 20% Alcohol, applied with a swab. —A. R. McFarland, Arch. Derm, Syph., Jan.,'28, per Pres., Oct.,'28,319.

STAPHYLOCOCCAL SEPTICÆMIA has been treated. A dilution of 1 in a million will inhibit the growth of Staphylococci. In a case of staphylococcal septicæmia in an infant 15 months old, 3 injections of a 0·25% aqueous solution were given at 24 hour intervals. First dose 5 mgr. per kilo of body weight. As the white cell count was reduced, the second and third doses were 3 mgr. per kilo. Blood cultures were sterile as result. The child finally recovered and was discharged from hospital.—D. T. Smith and H. Casparis, Jl.A.M.A., Dec. 29,'23.

Startling results may be obtained, but failures are equally numerous. The cases reported total about 40% definitely improved, 20% possibly improved and 40% unimproved. Used in 1 in 200 solution in water each Cc. containing 0·005 Gm. of dye, a full dose being 45 Cc. for a 7-stone patient. More concentrated solutions may cause thrombosis. Initial injection of 0·002 Gm. per kilo. Sharp temperature reaction, sometimes a chill, following injection. In favourable cases, following fall in temperature, improvement is marked. Value due to its bacteriostatic action in the blood stream.—W. D. Gatch, H. M. Trusler and J. E. Owen, Jl. A.M.A., Sept. 19/25,894.

In sepsis, when Gram+staphylococci are the sole or predominant etiologic organisms and when bacteria are accessible to blood stream, Gentian Violet intravenously is justifiable, indicated, and most beneficial. May be given in safety in doses varying from 0·003 to 0·007 Gm. per kilo in a 0·25 to 1% solution.—Per Jl. A.M.A., July 25/25,306.

Doses of less than 0·003 Gm. per kilo of little, if any, value. Several injections at intervals of one or several days often necessary.—Per Jl. A.M.A., Aug. 7/26,442.

THRUSH treated with local use of 1% aqueous solution. Apparent cure in one day or less in 50% of cases. Relapses on stopping treatment occasionally to be expected.—Jl. A.M.A. ii./25,901.

Auramine. *Syn.* TETRAMETHYLDIAMINO - DIPHENYL - KETONIMINE HYDROCHLORIDE. $C_{17}H_{22}N_3Cl.H_2O=303·6522$.

Dose.—1/3 grain (**0·02 Gm.**) has been given *per os*.

A yellow powder soluble in water. The solution is decomposed on boiling or on long standing in the cold, the imino group of the compound being converted into a Ketone group by hydrolysis, giving the insoluble Michler's Ketone and Ammonium Chloride.

A concentrated stable solution, ✱**Glauramine** (T.M. 440880) in **Glycerin** and **Alcohol** is, however, obtainable, which is diluted with water immediately before use.

In ear and nose surgery, and for skin operations might be tried intravenously (1 in 20,000)—T. H. Fairbrother and A. Renshaw, Jl. R.S.A., March, 16,1923, 313. It is not caustic or irritant to the tissues.—B.M.J. ii./24,504.

In bone suppuration Auramine is a good antiseptic.—Harry Platt.

ANTHRAX.—1 in 5,000 prevented growth and rendered sterile even spore cultures of *B. anthracis*. Auramine might be injected round the pustule, or to swab the cut surface of the wound after excision of pustule.—A. Renshaw, B.M.J. ii./24,504.

Intravenous Use.—0·01 Gm. per kilo is tolerated intravenously in rabbits.—F. G. Davis, Am. Jl. Sci., Feb. '21, p. 251.

SEPTICÆMIA.—Auramine 0·1 Gm. intravenously on the first two days and 30 Cc. of antistreptococcic serum subcutaneously on the first three days.—J. E. R. McDonagh, B.M.J. i./26,693.

Selective Action of Coal Tar Dyes.—As a general rule dyes with any marked action contain one or more *amido groups*. If it has a colloidal state in solution it is not likely to be a strong antiseptic.

Auramine and **Nile Blue,** 1 in 20,000 killed trypanosomes in 15 minutes.

Auramine also killed paramœcia in 15 minutes at 1 in 20,000, and it was only surpassed in this property by the Meldola blues, but the most powerful of these, Meldola blue D (1 in 80,000, 1 in 160,000), contains Zinc Chloride. Auramine killed twelve organisms (including anthrax) at 1 in 5,000, the culture media containing the bacteria were incubated for 48 hours with varying amounts of the dye and were then sub-cultured to detect sterility. Small gold-fishes, however, lived in a solution of 1 in 20,000 for 18 hours, whereas in Brilliant Green they died in 90 minutes. 1 in 500 of Phenol is necessary to kill paramoecium in 15 minutes, as against the 1 in 20,000 of Auramine.—F. H. Fairbrother and A. Renshaw, B.M.J. i./23,314,265; L. i./23,314. *Journ. Soc. Chem. Industry*, May, 1922; *Journ. Roy. Soc. Arts*, Vol. LXXI., Nos. 3668 and 3669, March, 1923.

Our experiments, using recognised methods, indicated a more moderate germicidal power, but 1 *in* 500 *killed* B. Coli *in seven and a half minutes.* (*For further details, see Vol. II.*)

Need of attacking the malaria and sleeping sickness problems on chemo-therapeutic research lines.—A. Renshaw, B.M.J. ii./26,857.

Midwifery.—*A Glycerin dilution of Glauramine* is suggested. See *Glycerin.*

Auramine is a constituent of ***Auremetine,*** *the compound used in amœbic dysentery, v. p.* 528.

Malachite Green. *Syn.* **Benzaldehyde Green.**

Characters.—This is chemically either the Zinc double chloride or oxalate of Tetra-methyl-di-para-amino-Triphenyl-carbinol: $(C_{23}H_{25}N_2Cl)_3 + 2ZnCl_2 + 2H_2O$ or $(C_{23}H_{24}N_2)_2\ (C_2H_2O_4)_3$. The former is in green prismatic crystals while the oxalate is in green metallic glistening plates.

Solubility.—The Zinc Double Salt by our experiments is soluble in water 1 in 20, very soluble in Alcohol, in Oleic Acid 1 in 14 (?) in Glycerin 1 in 7 (?), totally insoluble in Liquid Paraffin, Vaseline and Eucalyptol. The Oxalate is also soluble in water and Alcohol.

Uses.—During the war was much employed as an antiseptic wound dressing—especially as spray.

Stains on the hands with Malachite Green are easily removed by rubbing with a little cotton wool soaked in either Alcohol or dilute Hydrochloric Acid or dilute Acetic Acid.

Ⓟ **Cheatle's "Green Spray."** *Syn.* Ⓟ **Sublimate Malachite Green Solution.** *Syn.* SOLUTIO MALACHITI VIRIDIS ET HYDRARGYRI PERCHLORIDI K.C.H.

Equal parts of 2% Malachite Green in 80% Alcohol and 2% Mercuric Chloride in 80% Alcohol. The two solutions are best kept separate and mixed as required.

The spraying must be thorough and the spirit allowed to evaporate before applying the dressing. *Must not be used to mucous membranes.* Proved satisfactory at Haslar.—W. G. Axford and G. L. Cheatle, B.M.J. i./17,535.

Malachite Green kills *Staphylococcus Aureus* in serum in a dilution of 1 in 2,000, while it kills *B. subtilis* spores in a dilution of 1 in 5,000. Its effect is more marked in the case of Gram + bacteria, the commonest flora of war wounds. When mixed with Mercuric Chloride it does not diminish the effect of the latter.—L. ii./15,165. Valuable routine results from Malachite Green in naval hospitals.—Med. Res. Committee, B.M.J. i./17,769.

Brilliant Green. *Syn* TETRA - ETHYL - DIAMIDO - TRIPHENYL - CARBINOL in form of either Sulphate or Zinc Double Chloride (discovered 1879). In medicine the *Sulphate* $C_{27}H_{34}N_2O_4S$ is to be used. Yellow crystals, *soluble* in water and in Normal Saline and in Alcohol, forming a green solution.

Chemical Examination.—Samples which we have examined were mostly the Zinc double salt and probably much of the dye that is sold as Brilliant Green is in reality Malachite Green, the latter being in the form of Oxalate. *Fuse* with fusion mixture to liberate Zinc if present, before employing usual tests.

Antiseptic Power.—C. H. Browning and his co-workers found this substance to compare favourably with Acriflavine (*q.v.*), though the latter is more rapid.

Uses.—The dye was much used initially on their recommendation as a substitute for the yellow dye, and is still used, solutions of strength 1 in 1,000 being employed. As a dressing it is painless. These two had the highest "T.C." (*v.* Acriflavine). Brilliant Green differs, however, in that it is not advised to be introduced by injection into closed spaces.

Brilliant Green is almost as strongly bactericidal as Hexamethyl-Violet for *Staphylococcus aureus*, *B. diphtheriæ* or *B. anthracis* (a concentration of 1 in 5 million completely inhibited growth of these organisms on agar, whereas 1 in 250,000 of Mercuric Chloride was required for similar result). Hexamethyl-Violet, however, is so weak in its action on the coli-typhoid group as to render it of little value as an antiseptic against these organisms; whereas Brilliant Green is extremely potent in its action on the coli-typhoid group. Further, even in the presence of serum, Brilliant Green is very actively antiseptic. It is also highly inhibitory towards anaerobes, such as B. malignant œdema.—Browning and Gilmour, Jl. Path. and Bact. (Cambridge), Vol. XVIII., p.144.

The most powerful antiseptic investigated by a standard method using *Streptococcus fæcalis*.—Emery for Med. Res. Com., L. i./16,817; i./17,159.

Internal antisepsis by means of "Sulphate" dyes which contain Sulphuric Acid combined with the Alkyl Amino group.—M. Coplans and A. G. Green, Jl. Ph. and Exp. Ther., Oct., '27,433.

SEPTIC CONDITIONS of the ears have been treated with Brilliant Green ½%, Mercuric Chloride ½% in 90% Alcohol.

Bonney and Browning's Violet and Green Solution. *Syn.* **'Blue Paint.**

Brilliant Green and Crystal Violet (Hexa or Penta-Methyl Violet or a mixture of these), 1% each in a mixture of rectified spirit and water equal parts used to sterilise the skin.—V. Bonney and C. H. Browning, B.M.J. i./18,562.

Stains on the skin can be removed with spirit, those on clothes by spirit or washing with soap.

Brilliant Green Ointment. Brilliant Green 1 or 2% in twice the amount of Alcohol 90% and incorporated with Soft Paraffin.

Epithelial stimulant in various minor injuries and affections, *e.g.*, impetigo, indolent ulcers of various kinds, superficial shell wounds involving only the skin, blisters, etc.—R. W. Hodgson-Jones, B.M.J. i./17,455.

SYCOSIS. Remove crusts with 5% Salicylic Ointment, followed by epilation of loose pustule-encircled hairs and daily painting with 1% Alcoholic solution of Brilliant Green in 70% Alcohol. 53 cases cured after 12 to 25 applications, with no relapses.—L. i./32,202.

Brilliant Green Paste (Hey's). Brilliant Green 1, Boric Acid 275, French Chalk 25, Liquid Paraffin 200. The Green is incorporated, dissolved in a little spirit. For filling wound cavities.—Wilson H. Hey, B.M.J. ii./17,445.

CHOLERA VIBRIO is particularly susceptible to Brilliant Green. Suggested use in man. Dogs tolerate 1/5th grain *per os.*—L. Nicholls, L. ii./17,563.

Methyl Green is Chlor-Methyl-hexamethyl-*p*-rosaniline Hydrochloride. *Syn.* LIGHT GREEN.

Methylene Blue, Medicinal.—*Syn.* METHYLTHIONINÆ HYDROCHLORIDUM. U.S. X. METHYLENUM COERULEUM, P. Helv., FR. CX. ($+3H_2O$) P. Jap. IV., TETRAMETHYLTHIONINI CHLORIDUM, P. Belg. IV. $C_{16}H_{18}N_3Cl.S = 319{\cdot}6814$.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in pill, cachet or capsule; or hypodermically, 1 grain. Slipule No. 4 holds 1 grain.

Methylene Blue Sterules contain 1 Cc. of 5% solution for hypodermic use.

Dull dark green crystals, forming an intense blue solution in water. *Soluble* 1 in 50.—FR. CX. 1 in 20.

Incompatible with caustic alkalis.

Distinguish from the commercial compound with Zinc. Vide Vol. II.

(**Night Blue** (*cf.* McCrorie's stains Vol. II.) and **Patent Blue A** are more suitable for colouring Perchloride Solution.)

Uses.—Analgesic, of service in rheumatism and painful nervous affections; also in malaria, ague, nephritis and retinitis. *Colours urine blue, and fæces become blue on exposure to air.*

Chlorinated Soda Solution will remove stains caused by it.

ACTINOMYCOSIS.—Two grain doses thrice daily, increased to 5 grains has been used. Nausea, dizziness and weakness were evidenced at first but soon disappeared. A 3% solution was injected locally but abandoned on account of pain. X rays alone or in combination with drugs should be sufficient.—Jl. A.M.A., Nov. 27/1920, p. 1470, per Pres. Feb., '21, p. 34.

BLACKWATER FEVER.—Œdema appeared lessened by its use.

COLITIS ULCERATIVE—Irrigation with 1 in 1,000 solution has been tried.

CYSTITIS.—Two grains should be given *per os* and the bladder washed out with 2% solution. In dysentery a rectal injection 1 in 5,000. In chronic suppurative otitis media and conjunctivitis—1 in 500 solution warm is instilled. In intertriginous eczemas, 3 to 5% solution. It has been used in bilharziasis.

GONORRHŒA.—Hare suggests capsules of 2 grains, oil of sandal wood 3 minims, oleo-resin of copaiba 3 grains, oil of cinnamon 1 minim.

PURULENT DISCHARGE (due to *S. aureus*) from the eye socket well treated by 0·1% solution.—H. M. McIlroy, B.M.J. i./19,405.

MALARIA treated by Methylene Blue—experience of 5,000 three grain doses. Though inferior to Quinine in cutting short attacks it is valuable in preventing relapses. No fear of 'toxic' symptoms.—D. G. Marshall, L. i./20,1334.

Methylene Blue used as a substitute for Quinine in mild but refractory cases. It is given in 0·1 or 0·2 Gm., to a total of 1·5 Gm.—Pres., Jan., '27,26.

Specially useful in cases refractory to Quinine. Dose 0·05 Gm. in 5 Cc. water, from two to *five doses during day intravenously*—well tolerated: or by the mouth up to a total of 1·5 Gm. taken during meals. Subcutaneously may *cause abscess.*—Per Jl. A.M.A. ii./26,712.

Intrapleural injection of 200 Cc. of 5% solution caused death in a case of empyema. Animal experiments showed that 0·0005 Gm. of Methylene Blue is toxic, and 0·005 Gm. lethal, for mice.—D. M. W., per Jl. A.M.A. ii./25,395.

For Methylene Blue, Indigo Carmine, Phenol Red and other Tests of the Kidneys, see Vol. II.

Soudan Red III. AMINOAZOBENZENE-AZO-BETANAPHTHOL.

$C_{22}H_{16}N_4O.=352·1568$. A brown dye for colouring fats, and in histology.

Chrysoidine.—DIAMIDOAZOBENZENE HYDROCHLORIDE.

$C_6H_5N_2C_6H_3(NH_2)_2HCl.=248·5904$. An orange dye, slightly soluble.

Phenacetinum. *Syn.* **Acetphenetidinum, Acet - para - phenalide** (*B.P.* '14), **U.S., Fr. Cx., P. Austr., Ph. Ned. V., P. Ital. V., Fenedina, Fenina, F.E. VIII.** $C_2H_5O.C_6H_4.NH.COCH_3$ 1 : 4 = 179·1094.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets, tablets (Slipule No. 1 holds 5 grains), or suspended in mucilaginous fluids. **P.G.V.** max. single dose 15 grains. Max. during 24 hours 45 grains, approx.

An acetyl compound of Phenetidin, $C_6H_4(NH_2)OC_2H_5=137·0938$ (the ethylic ether of paraminophenol). It is analogous to acetanilide (antifebrin). White, shining, laminar crystals, M. Pt. 135° C., tasteless, ***soluble*** sparingly in water, 1 in 21 of alcohol (90%), and in sulphuric acid without colour.

Manufacture, Notes on —*See Vol. II.*

Does not liquefy with sodium salicylate, but phenazone does, *e.g.*, Phenacetin 10 grains, Caffeine Citrate, 2 grains, Sodium Salicylate 5 grains, are not incompatible.

Uses.—Reduces temperature and soothes pain, very rarely causes rash or cyanosis. Successful in rheumatism, neuralgia, migraine, and hysteria. In first stage of influenza relieves headache and mitigates aching of limbs.

The safest of the antipyretics.—Dixon, p. 245.

This and other anilides, *e.g.*, Acetanilide, are only slowly hydrolised in the organism with liberation of the parent basis—hence their activity.—O. C. M. Davis, B.M.J. ii./22,11.

Antipyretic effect of Phenacetin is enhanced by Magnesium Oxide in proportions of Phenacetin 2 : Magnesium Oxide 1. Probable synergistic action.—J. E. Winter and co-workers, Jl. Pharm. and Exp. Therap., Mar., '30,347.

TABES DORSALIS.—Useful to control pains.—L. i./10,355.

Toxic Effects from large amounts (60 to 70 grains) taken in error or intentionally. Treatment is: Whisky, Strychnine hypodermically, strong coffee, large quantities of hot water (*not* stomach tube).

Effervescent Phenacetin. *Dose.*—1 drachm (**4·0 Gm.**) or more. In two strengths, 5 and 10 grains in 1 drachm respectively.

Tablets 4, 5 and 10 grains. Also 4 grains with **Caffeine** 1 grain, also Ⓟ2½ grains with **Sulphonal** 2½ grains. *Dose.*—1 or more.

Phenacetinum cum Caffeina Effervescens.

Dose.—1 to 2 drachms.

Contains 5% Phenacetin and 2½% Caffeine Citrate.

Phenocoll Hydrochloridum, **Hydrochloride of Amido-acet-para-phenetidin,** a derivative of Phenacetin.

TRADE MARK: The word Phenocoll alone is not registered. T.M. 157131 (1891) is a device embodying the word. PATENT 5269/1891 ***expired*** 1903.

$$C_6H_4\begin{cases}O.C_2H_5\\NH(C_2H_2O)NH_2\end{cases}HCl.=230{\cdot}59.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

A white crystalline powder with sharp saline taste, made by the action of Ammonia on Bromophenacetin. ***Soluble*** about 1 in 16 of water.

Rheumatoid arthritis is treated with Phenocoll combined with Piperazin (*q.v.*) Also beneficial in neuralgia arising from sudden cold and for headaches and pertussis (½ grain hourly). In malaria a prophylactic.

Phenazonum (*B.P.* '14). U.S. X., FR. CX., P.G. VI., PH. NED. V., etc. *Syns.* ANALGÉSINE, ANTIPYRINUM, DIMETHYL OXY-QUINIZINE, PHENYLDIMETHYL-ISO-PYRAZOLONE.

TRADE MARKS: ✱ "Dr. Knorr's Antipyrine" No. 42855, was Registered in 1885, and has since been periodically renewed. A label bearing the word PHENAZON and device of three stars is also a T.M.—No. 208865.

PATENT: 3097/1884 to the same firm remained in force 14 years, but now ***expired.***

$$(CH_3)N.C(CH_3):CH.CO.N(C_6H_5)=188{\cdot}1096.$$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets, tablets, or solution. Slipule No. 1 holds 5 grains; No. 0 holds 10 grains. **U.S.** *Average dose.*—5 grains. *Hypodermically* 4 grains (0·25 Gm.)—*painful.* Was given with Cocaine Hydrochloride 1/5 grain.

Manufacture.—Condensation of Phenylhydrazine and Aceto-Acetic-Ethyl Ester followed by methylation.—C.D. ii./14, p. 273.

In white crystalline bitterish scales or powder. Gives a deep red colour with ferric chloride, nearly discharged by diluted sulphuric acid.

Soluble 1 in 1¼ of water, about 1 in 1 of alcohol and chloroform, and 1 in 40 of ether.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Rosæ, Syl Vanillæ; Aqua Menthæ Piperitæ, Syrupus Limonis, Syrupus Aurantii.

Given as an enema if contra-indicated by the mouth.

Uses.—It is an analgesic, reduces the temperature of fevers, and the pyrexia of pneumonia, pleurisy, phthisis, and erysipelas. In doses of 4 to 15 grains it relieves locomotor ataxy, chorea, migraine, facial neuralgia, rheumatism, sciatica, and sea-sickness. Hypodermically for lumbago, sciatica, angina pectoris, biliary and renal colic, and dysmenorrhœa. A skin rash has at times been observed after its use, and in the past some poisonous effects were reported. Solution applied locally is hæmostatic.

Antidotes.—Administer brandy or ether, atropine, strychnine or oxygen. Warmth to the feet and body.

Phenazone acts quickly, but its effects soon pass off. It acts partly as phenazone and partly as oxyphenazone, and is excreted as such. Interesting details *re* discovery and early uses.—Gordon Sharp, P.J. ii./15,198.

Incompatible with spirit of nitrous ether, or other nitrites in the presence of free acid, an apparently inert bluish-green iso-nitroso-antipyrine being formed; also with the cinchona alkaloids, forming a precipitate which is soluble in weak acids.

Further, with phenol, tannic acid, iodine, or mercuric chloride (precipitates); amyl nitrite, ammonia alum, hydrochloric acid, ferric chloride, ferrous and ferric sulphates, cupric sulphate, nitrous acid, sodium bicarbonate or orthoform. *In general it is best to administer antipyrin alone.*

Calomel and Antipyrin are incompatible. Reaction in presence of alkali with marked toxicity.—J.C.S.A. i./20,94.

Liquefies with butyl-chloral hydrate, β-naphthol and sodium salicylate, but solutions with the latter keep if dilute.

SCIATICA.—The following relieves the painful symptoms:—Phenazone 6 grains, Phenacetin 3 grains, Exalgin 1½ grains, Potassium Sulphate 1½ grains, Dover's Powder (*sine Ipecacuanha*) 3 grains. To be given in a cachet three or four times in the 24 hours. Good effects are also obtained from the following:—Phenazone 5 grains, Phenacetin 5 grains, Opium Powder ⅙ grain, in a cachet; 3 to 6 of which can be taken each day.

Antipyrin (4 Gm. in 10 Cc. of water with a little Novocain) by perineural injection also alleviates pain.—Pr., May, '25,382.

In middle-ear diseases, otitis media and inflammation of the tympanum, and tympanic membrane a 5% solution of Phenyl-dimethyl-pyrazolone (✱**Otalgan**, T.M. 416863) in Glycerin is used by instillation.

GLOSSOPHARYNGEAL NEURALGIA well treated by Phenazone and Gelsemium.—J. P. Martin, B.M.J. i./31,533.

Effervescent Antipyrin contains 5 or 10 grains in a drachm.

Dose.—One teaspoonful or more.

Tablets of Antipyrin contain 2½ and 5 grains each. *Dose.*—1 to 4 or more. Also 3 grains and **Caffeine** 1 grain.

Mistura Phenazoni Expectorans, St. Th. H.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Phenazone 1 grain, Potassium Iodide ½ grain, Ammonium Carbonate ½ grain, Ipecacuanha Wine 3 minims, Syrup ½ drachm, Dill Water to 1 drachm.

Local hæmorrhage of hæmophilia has been treated by application of a strong solution of Antipyrin in Ferric Chloride.

Ⓟ**Pommade Reclus.** Phenazone 5, Salol 3, Boric Acid 3, Iodoform 1, Phenol 1, Mercuric Chloride 0·1, Vaseline to 200. The formula is often modified, *e.g.*, that of FR. CX. Nouv. Supp., '26—it may be diluted or made much stronger. For burns 1 or 2% Orthoform may be added.

Antipyrinum Salicylicum, P. Austr., P. Belg., Fr. Cx., P. Helv., P. Jap., P.G. VI., Ph. Ned. V. *Syn.*—SALIPYRIN, PYRAZOLONUM PHENYL-DIMETHYLICUM-SALICYLICUM.

$C_{11}H_{12}N_2O.C_6H_4(OH)(COOH)=326·1564$. *Dose.*—15 to 30 grains (**1 to 2 Gm.**). Max. single dose 2 Gm., *pro die* 6 Gm.

Manufacture.—Warm on a water bath Antipyrin 188 with Salicylic Acid 138. They liquefy and on resolidifying may be recrystallised.

The process in the Patent Specification 10432/1890 which was in force for 12 years states that Phenylhydrazin, Aceto-acetic Ether, Methyl Salicylic Ether, Hydriodic Acid and Methyl Alcohol have to be heated together under pressure at 160—180° C. (!)

A white crystalline powder, with sweetish taste, sparingly *soluble* in water; incompatible with acids, alkalis, and nitrites.

Useful in acute rheumatic fever and in chronic rheumatism, and sciatica; also for influenza and any acute catarrh and for menorrhagia; as antipyretic in dose double that of Antipyrine.

Tablets contain 5 grains (**0·3 Gm.**).

Acetopyrin (T.M. Expired).—*Syn.* ANTIPYRIN ACETO-SALICYLAS.

$C_6H_4 < \begin{matrix} O.CH_3CO \\ COOH \end{matrix} .C_6H_5.N < \begin{matrix} CO....CH \\ N(CH_3).\ddot{C}.CH_3 \end{matrix} = 368{\cdot}172.$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

A white crystalline powder, ***soluble*** 1 in 160 water, but about 1 in $3\frac{1}{2}$ of Alcohol 90%. Analgesic, antipyretic, and anti-arthritic, used in sciatica, hemicrania, influenza, etc.

Ferropyrin. $Fe_2Cl_6 3(C_{11}H_{12}N_2O) = 888{\cdot}7508$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

A soluble orange-coloured powder. Given for chlorosis and anæmia. It is hæmostatic and locally astringent, applied pure or 20% aqueous solution; and in gonorrhœa, injections 1%. *Incompatible* with Salicylic Acid.

✱**Quadronal** (T.M. 514585).

A preparation containing Phenazone, Lactophenin, Phenacetin, Magnesium Peroxide, Caffeine and Hexamine. Analgesic, antineuralgic and sedative.

℗✱**Quadro-Nox** (T.M. 514585).

Dose.—$\frac{1}{2}$ to $1\frac{1}{2}$ 9-grain tablets, softened in hot water, 2 hours before bedtime.

A proprietary ,stated to contain Phenazone $\frac{1}{2}$ grain, Lactophenin 1/50 grain, Veronal $7\frac{1}{3}$ grains, Phenacetin $\frac{1}{2}$ grain, Hexamine 1/10 grain, Magnesium Peroxide 1/12 grain. It contains 80% Veronal.

Uses.—Hypnotic in nervous insomnia and pain.

✱**Felsol** (T.M. 472588).

Dose.—First week: 1 powder thrice weekly an hour after meals. Second week: 1 powder night and morning. Third week: 1 powder every morning. For children from 2 to 10 reduce to $\frac{1}{4}$ or $\frac{1}{2}$ dose. Place powder on tongue and swallow with drink of water.

Composition stated to be Phenazone 0·47, Iodopyrin 0·03, Anilipyrine β 0·4, Caffeine 0·1, Ext. Visci Alb. 0·01 and Ext. Brachycladii 0·01. As a prophylactic and remedy for asthma. Makers state it can be used in cases of cardiac affections and is not cumulative.

Anilipyrin α **and** β. *Dose.*—$7\frac{1}{2}$ grains (0.5 Gm.). According to Gehe, these are condensation products 1 : 1 and 2 : 1 of Phenazone and Acetanilide.

Amidopyrin. U.S. X. ✱**Pyramidon** (T.M. 215952 and 360918.)

DIMETHYL-AMIDO-ANTIPYRINUM. *Syn.* DIMETHYL-AMINO-ANTIPYRINE. AMIDOFEBRIN. P. ITAL. V., FR. CX., P. JAP., P.G. VI., PH. NED. V., P. BELG. IV., F.E. VIII.

$C_{11}H_{11}(N[CH_3]_2)N_2O = 231{\cdot}1566$.

Dose.—5 to 8 grains (**0·3 to 0·5 Gm.**). Slipule No. 0 holds 5 grains. FR. CX. has max. single 15 grains; max. during 24 hours 45 grains approx.

PATENTS: 7709/1896 and 9268/1897 (***expired***) U.S. Patent 579,412 (1897).

Manufacture.—Nitrosoantipyrin is reduced to Amidoantipyrin which is then methylated. (*See* also Edn. XVII, p. 316; Edn. XVIII, p. 336, and Edn. XIX, p. 330.)

A white powder with M.Pt. 108° C. ***Soluble*** about 1 in 9 of water and 1 in 2 of alcohol 90%. Incompatible with Amyl Nitrite, Apomorphine and Gum Acacia.

Uses.—Antipyretic; similar to Phenazone, but effective in smaller doses; of special effect in sciatica.

MEASLES well treated. *Dose.*—2 to 5 grains in teaspoon with a little water. 12 powders at 4-hourly intervals day and night. Completely aborts if given early.—J. I. Collier, B.M.J. i./30, 1093.

See also G. H. Urquhart and A. H. Winchester, B.M.J. i./30,1153; H. B. Gladstone 1198.

150 cases. 1 grain for each year of age, with a maximum of 5 grains. Temperature drops to normal within 24 hours, with improvements in general condition. Given 4-hourly day and night until temperature settled.—G. W. Ronaldson and J. I. Collier, B.M.J. ii./30,995. On the other hand, W. H. W. Attlee treated 120 cases on 'ordinary' lines against 9 with Amidopyrin and was not favourably impressed.—*Ibid.*, 996. Definitely good from 1 to 9 years, but over 12 it is not indicated.—H. G. Gladstone, B.M.J. ii./30,1103. The boys in an epidemic *with* it were more comfortable and seemed less ill.—G. E. Friend, B.M.J. i./31,33. Effective. Apparently specific.—T. Pires, B.M.J. i./31,734.

Amidopyrin Camphorate (*Dose*—8 to 12 grains), **Bicamphorate** and **Neutral Camphorate** (*Dose*—12 to 15 grains), and **Salicylate** (P. Ital. V.) (*Dose*—8 to 12 grains) are also prepared. (Patents lapsed.)

The Camphorates are antipyretic, and have been advocated to suppress the sweats in phthisis, but why combine the antipyretic with Camphoric Acid—an active antisudorific? The Salicylate is given in rheumatic affections.

Gardan Tablets, 5 grains.

A combination of Pyramidon and Novalgin (*v. postea*). *Dose.*—5 to 10 grains (1 or 2 tablets) two or three times daily as an antipyretic and analgesic.

FIBROSITIS.—6 grain doses of Amidopyrin enhance the utility of Aspirin (10 grains) in relieving pain.—A. P. Luff.

Novalgin. *Syn.* Nynalgin, Sodium Phenyl-dimethyl-pyrazolon-methyl-amino-methane-sulphonate.

Dose.—One tablet (7½ grains) thrice daily, after meals, with water.

An Amidopyrin derivative introduced as an anti-rheumatic, stated to be better tolerated and more effective than Salicylates, for use in articular and muscular rheumatism, sciatica, polyarthritis, and lumbago.

An injection of 1 to 2 Cc. 50% Novalgin solution available in ampoules is also given as analgesic.

℗1 **Amidopyrin diethyl-barbiturate, Dimethylaminophenyldimethylpyrazolon Di-ethylbarbiturate.** *Syn.* ✱ ℗1 VERAMON (T.M. 418411). $C_{34}H_{46}N_8O_5 = 646{\cdot}4228$.

Dose.—Adult 1 to 2 tablets; children ¼ to 1 tablet, followed by half glass of water.

A combination of Amidopyrin and Veronal (*see* P.J. i./29,193) for use as analgesic in headache, migraine and neuralgia. Useful in dysmenorrhœa and for the pains of bilious and renal calculus.

℗1✱**Cibalgin** (T.M. 455201).

A compound of Amidopyrin with Dial.

Tablets 4 grains (0·25 Gm.): *Dose* 1 to 4. Liquid for oral use, 1 Cc. = 0·25 Gm. (4 grains) Cibalgin: *Dose* 1 to 4 Cc. Ampoules each containing 2·3 Cc. Cibalgin (1 Cc. = 0·25 Gm.): *Dose* ½ or 1 ampoule daily. The tablets and liquid should be taken with a little warm water or tea, but not in coffee. In neuralgia, migraine, and other types of pain, *e.g.*, dysmenorrhœa, articular and muscular pain.

Annotation on.—B.M.J. ii./25,910.

✱**Dismenol** (T.M. 432802) is a mixture of Amidopyrin and Parasulphamidobenzoic Acid, $C_6H_4.SO_2.NH_2.COOH$, used in dysmenorrhœa.

Dose.—1 tablet two or three times daily.

✱**Compral** (T.M. 466699). A new analgesic—Pyramidon combined with Trichlorethyl-urethane for use in dysmenorrhœa and pain generally.—L. i./30,930. Tablets contain 7½ grains.

COCÆ FOLIA.

℗1 "*Coca, any preparation or admixture of, containing* 0·1 *or more per cent. of Coca alkaloids.*"

℗ *Cocaine and Ecgonine and their respective salts, preparations and substances containing not less than one-tenth per cent.* (*one part in* 1000) *of cocaine or ecgonine.*

See also Dangerous Drugs Acts.

Coca Leaves and Indian Hemp Regulations.—P.J. ii./28,262.

History of Coca. The plant originally named "Khoka," meaning "the tree of trees," first became known in Europe through the writings of Garcilaso Inca de la Vega, a student of Peruvian history, who died in 1616. Joseph de Jussieu in 1750 was the first to send specimens of the plant to Europe.—P.J. i./09,28; i./09,485.

The late W. Martindale had much to do with the introduction of Coca and Cocaine about the year 1884. He wrote a book '**Coca and Cocaine,**' which went through several editions and which is a classic on the subject. Many new preparations of the drug were devised by him and made in his laboratory. See also Historical Note by J. H. E. Brock under Cocaine.

℗ ℗1 **Cocæ Folia** (*B.P.* '98), P. Ital. V. *Syn.* CUCA.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

The dried leaves of Erythroxylum Coca and its varieties (*Linaceæ*) FR. CX.

Two varieties occur in commerce, the leaves of *E. Coca* var. *Bolivianum*, known as Bolivian or Huanuco leaves, and those of *E. Truxillense* (Rusby), the Peruvian or Truxillo variety, which is sufficiently distinct to be now considered as a separate species, although formerly regarded as a form only of *E. Coca*.

The Bolivian leaves are browner, larger, broader and thicker; the veins are prominent; and there are clearly defined lines on each side of the midrib, which shows a distinct ridge in its centre.

Those of *E. Truxillense* are pale green; less oval and more elliptical in outline; and are much more fragile, being frequently broken.

The Bolivian leaves, imported from that country, are preferred for medicinal use, since a larger proportion of the alkaloids is Cocaine. Java supplies most of the Truxillo variety. Ceylon was at one time a regular producer, but cultivation was abandoned at the request of the British Government.

To avoid the loss of alkaloid during transport of the leaves, it is customary in Cocaine manufacture to isolate the crude alkaloid near the plantations, purification being carried out in Europe.—From C. & D. Commercial Compendium, i./25,149.

MORPHOLOGICAL AND HISTOLOGICAL CHARACTERS of a large number of Cocas, with elaborate data as to thickness, shape and size of leaves.—C. W. Ballard, Jl. Am. Ph. A., May, June, July, '26, per C.D., Oct. 30/26,657.

The leaves contain the crystalline alkaloid Cocaine, *q.v.* A content of 0·5% of this base has been suggested as a standard. For ℗purposes 0·1% of Cocaine or Ecgonine brings the leaves within the meaning of the Act. They are said to be most active when freshly dried, and are much used by the natives in Bolivia and Peru, miners, travellers, and others. *For details of assay by the author and others* ***vide Vol. II.***

Coca Leaf chewing in Bolivia. To the Indian there are two things for the attainment of which all else is only the means—coca and alcohol. The Indian of the Puna (highlands) chews coca incessantly, in addition to a small bit of lejia—a grey substance like a bit of tailor's chalk, composed of boiled potatoes ground into a paste with wood ash, dried and made into little flat cakes. This enhances the flavour and effect (it liberates the alkaloids). Some peons use as much as two pounds of dried leaf per week.—From 'Six Years in Bolivia,' by A. V. L. Guise (T. Fisher Unwin), quoted, P.J. i./23,55.

Time is given specially to workmen for coca chewing in the morning and afternoon. A man uses 2 to 4 ounces a day. Staves off hunger and weariness. Gives stamina on journeys. Indians use it in native religious rites.—D. R. McLean, P.J. ii./30,27; C. E. Green, *ibid.* 51.

Ⓟ **Coca-Chewing Gum** is prepared containing in each piece (weighing 45 grains) 2 grains of extract (=about $\frac{1}{25}$ grain of Coca Alkaloids).

Ⓟ **Elixir Cocæ.**—6 parts are equivalent to 1 of the leaves.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) in water is a palatable preparation. Standardised to 0·075% Coca Alkaloids.

𝔇 ℙ1 **Extractum Cocæ.**

Dose.—2 to 15 grains (**0·12 to 1 Gm.**), in pills or pastils. A 'solid' or powdered extract. Made with alcohol 60% standardised to 2% Coca Alkaloids (1=about 4 of leaves).

𝔇 ℙ1 **Extractum Cocæ Liquidum** (*B.P.* '98).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**). 1=1 of leaves exhausted with 60% alcohol. It therefore contains approx. 0·5% Coca alkaloids. (45 or even 30% alcohol would make it more miscible.)

A single emergency dose of Extractum Cocæ Liquidum (1 in 1), said to act 'like a charm' in cases of *hæmorrhage due to piles*, when patient has to stand for any length of time.—C. E. Shelley, Pr., Sept., '23/211.

If freed from wax, it is miscible with water and more palatable.

Flavoring.—Syl Vanillæ, Glyl Coriandri; Elixir Saccharin.

𝔇 ℙ1 **Fluidextractum Cocæ, U.S.** *Dose.*—30 minims. Standard 0·5 Gm. ether-soluble alkaloids in 100 Cc.

Ⓟ **Infusum Cocæ.**—1 in 50 of boiling water.

Is a refreshing beverage with a slice of lemon.

𝔇 ℙ1 **Pastillus Cocæ Extracti.**—2½ grains (**0·15 Gm.**) of the extract in each. Each contains 1/20 grain Coca Alkaloids (0·25%). *Dose.*—One every two or three hours.

For loss of voice due to weakness or relaxation of the vocal cords.

𝔇 ℙ1 **Vinum Cocæ.**

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ ounce (**8 to 15 Cc.**) diluted with wine or water. Checks vomiting of irritable stomach.

To be sold without a licence it must contain half a grain of alkaloid in the ounce (0·114%).

Uses of Coca.—Coca has been praised as a nervine and muscular tonic, preventing waste of tissue, appeasing hunger and thirst, relieving fatigue, aiding free respiration, and as being useful in various diseases of the digestive and respiratory organs; it is recommended for indigestion, gastralgia, gastrodynia, nausea, sickness, distaste for food, is given to relieve pain, nausea, vomiting or discomfort caused by excess in either eating or drinking, or by regnancy, and as a cure for morphine and alcohol craving. In using it for

the latter in America it is said in some cases to have produced 'Coca Craving.' The leaves are sometimes smoked to relieve asthma; and used generally for the stimulant and narcotic effect of tobacco and alcohol.—From 'Coca and Cocaine,' W. Martindale (1886).

℞ ℙ1 **Cocaina** (*B.P.*'14). F.E. VIII. *Syn.* METHYL-BENZOYL-ECGONINE. $C_9H_{13}(CH_3)\ (C_6H_5CO)NO_3$=303·1718.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), in a pill or tablet.

This important alkaloid crystallises in shining monoclinic prisms. It was obtained from Coca, and was first isolated by Niemann in 1860.

First use of Cocaine.—J. H. E. Brock, so far as we are aware, was the first to use Cocaine subcutaneously for surgical purposes, after trials upon himself. He writes us recently (1931) as follows:—

'I made my experiments with Cocaine in 1884, when in residence at University College Hospital as H.P. to Sidney Ringer. He mentioned that Cocaine, a new drug, was being used in Vienna as an anæsthetic for eye work, and suggested that I should get some of the drug and try it on myself as a local anæsthetic to the skin. He could give me no information about dosage: and as to its toxic effects he knew nothing. I obtained it from Martindale's. I tried the effect of the drug first as a surface application to the skin, but found it quite inert. I then made a solution and asked my friend, the late C. J. Arkle, a fellow resident, to give me the injections and test my cutaneous sensibility to tactile, thermal, and painful sensation, and their distribution around the site of injection. The distance apart at which the points of a compass could be distinguished as 2 points was also investigated. I ***began with a dose of 1/6 grain,*** and increased to $\frac{1}{4}$ grain, 1/3 grain, and $\frac{1}{2}$ grain. Fortunately I stopped at the last. As he used to give me 2 or 3 injections successively at a sitting, it was really remarkable that I was not numbered with the transgressors and sent beyond Jordan. I remember feeling some oppression in my breathing, but nothing more.

'Having established the fact that Cocaine injected subcutaneously was a local anæsthetic, and the area of skin anæsthetised around the site of injection, I asked the late Mr. Littlewood, then a House Surgeon at U.C.H., to let me give his next minor operation a subcutaneous injection of Cocaine to test its use in Surgery. He agreed, and I injected $\frac{1}{4}$ grain over the surface of a bubo that he was going to open. The result was not complete anæsthesia, but was sufficient to allow him to complete the operation. As far as I know this was ***the first time that Cocaine had been injected subcutaneously for surgical purposes.***

'The paper containing my results was published in the British Medical Journal at the end of 1884.'

Carl Koller, who introduced Cocaine local analgesia in 1884, states: 'It is a curious fact that while many substitutes have been tried by a whole army of investigators, *Cocaine, in spite of all its disadvantages, after almost half a century, has not been supplanted as the most efficient local anæsthetic.*'—Per Pres., June, '30,216.

For Notes on Extraction of (Crude) Cocaine see Vol. II.

Since 1928 Cocaine has been made under licence in this country by one firm and 9326 ounces were produced in one year.—B.M.J. ii./30.151.

For notes on Cocaine Addiction, see pages 341, 342.

Soluble 1 in 10 of 90% alcohol, about 1 in 100 to 150 of liquid or soft paraffin; 10 to 20% of olive oil will assist solubility, freely so in chloroform (2 in 1), ether (about 1 in 4), oil of cloves, and many other volatile oils, and 1 in 10 of castor, and other fixed oils, 1 in 2 of anhydrous lanolin (warmed); 1 in 80 of petroleum spirit. Soluble in water to the extent of 1 in 1300. In 1% Sodium Bicarbonate 1 in 1000. Insoluble in glycerin.

Cocaine Poisoning.—Methods of examination. Useful summary.—B.M.J. i./13,16.

Antidotes.—Stomach-tube. Toxic effects are best counteracted by amyl nitrite, nitro-glycerin, digitalis, strychnine, or ammonia, with strong coffee by mouth or enema, and ether hypodermically (5 minims). Anæsthesia by chloroform and ether may be required to prevent respiratory spasms.

Hyoscine hypodermically, or 10% solution of Calcium Chloride intravenously have been found safe antidotes for incipient Cocaine poisoning.—L. ii./23,1300.

Urethral Injection of 3 grains in retention of urine has caused poisoning.

Treatment of acute intoxication from subcutaneous injection of Cocaine, Procaine, Butyn, and similar local anæsthetics. Of drugs with prophylactic value the efficacy increased in the following order: Chloral Hydrate, Paraldehyde, Sodium Barbital, Sodium Phenobarbital, and Sodium Amytal. Urethane and Ether not consistent and respiratory stimulants of no value.—P. K. Knoefel and co-workers, Jl. Pharm. & Exp. Therap., Aug., '30,410.

℗ ℙ1 **Bougies of Cocaine** ½ grain (**0·03 Gm.**) or more, with cacao butter. Useful in urethral affections.

℗ ℙ1 **Cocaine-Lanolin**—*Martindale,* containing 10% Cocaine Hydrochloride, for dental use. A small amount to be carefully sealed in the cavity and left for two or three days acts "like a charm."

℗ ℙ1 **Cocaine-Menthol-Phenol.**—Equal parts liquefy and form a paste for inserting into tooth cavities; stops the pain promptly.

Mélange Anesthésique de Bonain, Fr. Cx. Nouv. Supp. '26, is this, using Cocaine Hydrochloride.

℗ ℙ1 **'Cocaine-Menthol-Eugenol'**—Cocaine, Menthol, Eugenol and Alcohol 90% equal parts. Applied on a pledget of cotton wool, followed by jets of cold air, *e.g.*, from a chip syringe, relieves toothache rapidly.

℗ ℙ1 Camphor 5, Chloral 5, Cocaine Hydrochloride 1, warmed, form an oily liquid which cures toothache.

℗ ℙ1 **Cocaine in Clove Oil,** 5%. Relieves toothache and earache.

℗ ℙ1 **Nebula Cocainæ Oleosa,** 5%.

Cocaine Base 1, Oleic Acid 4, Liquid Paraffin to 20.

In cauterising laryngeal growths a solution of the base in olive oil has been used to anæsthetise the tracheal mucous membrane and allay the cough.

℗ ℙ1 **Oleum cum Cocaina.**

A 2% solution in almond oil is mostly used for earache. For the eye a 2% solution in **Castor Oil** is used, may be combined with Homatropine; for catheters, a solution in equal parts castor and almond oils is useful.

ℙ1 **Cocaine Eye Drops, Factory Act, Solution No. 1.**

Specifically exempted from ℗ *but caution it is* ℙ1. *See also Dangerous Drugs Acts.*

For a foreign body in the eye.

Dissolve powdered Cocaine (base) 0·5 Gm. in Castor Oil 95 Gm. on a water bath. While still warm add 1 Cc. of a solution containing 0·33 Gm. Mercuric Chloride in 10 Cc. of Absolute Alcohol. Mix by rotating. Apply with a camel hair brush.—Issued by the Factory Dept. of the Home Office, 1917.

Ethocaine Base 2·0, Chlorbutol 0·5, Castor Oil 191 Gm. may replace Cocaine Eye Drops (Factories Act).—P.J. i/30,443. A draft idea so far.

℞ ℙ **Unguentum Cocainæ** (*B.P.* '14).—Cocaine 4%. Useful where absorption is required, as in facial neuralgia, shingles, eczema, erysipelas, urticaria, and pruritus (R.O.H. has Cocaine 1, to Soft Paraffin 50; heat to dissolve and stir till cold).

Assay of Cocaine in *B.P.* '14 ointment.—H. J. Foster, P.J. i./21,479.

℞ ℙ **Petrolatum Cocainæ.** Is made with Cocaine (base), 1, 2, 4, and 10%. The 1 or 2% are suitable for eye work, and the 4 and stronger percentages are useful for catheterisation, burns, and for intense sensitiveness of parts, pruritus, etc.

℞ ℙ **Cocainæ Hydrochloridum.** In most national Pharmacopœias. $C_{17}H_{21}NO_4HCl=339{\cdot}6366$. To be anhydrous.—F.I.

Usual Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), but more may be given, in solution, pill or pastil. (*B.P.* '14) $\frac{1}{10}$ to $\frac{1}{4}$ grain. *Hypodermically* $\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·015 to 0·03 Gm.**).

Fr. Cx. &. P.G. VI. *maximum single dose,* $\frac{3}{4}$ grain; maximum during 24 hours, $2\frac{1}{4}$ grains approx. P. Ital.V. $\frac{1}{2}$ and 1 grain respectively.

Shining, lamellar crystals, with bitterish taste. One part of Cocaine base=1·12 of the Hydrochloride.

Soluble 2 in 1 of water, also in alcohol and in glycerin, insoluble in ether, fats, and oils. It will crystallise with 9·5% of water of crystallisation, but the anhydrous salt is preferred. M. Pt. 183° C.

Glycerin of Starch is a useful solvent. A solution in this can be applied locally without lint or wool. Keeps well and is economical. —J. T. Hall, B.M.J. i./17,765. L. i./17,824.

Incompatible with ammonium carbonate (soluble in excess), carbolic acid, mercuric and mercurous chlorides. It is also precipitated by borax.

When borax and Cocaine hydrochloride are prescribed together, a weight of Boric Acid equal to that of the borax should be ordered at the same time to prevent precipitation.

In dispensing White Precipitate with cocaine hydrochloride in the form of an ointment, dissolve the cocaine salt in a drop or two of water. Rub the white precipitate down with a little almond oil, mix, and add the remainder of the ointment base—*e.g.*, soft paraffin.

With Phenol, Cocaine Hydrochloride is compatible in presence of Glycerin or Alcohol, but not in aqueous solutions.—P.J. i./25,233, C. & D., i./25,313.

Uses of Cocaine and its Salts.

Renders the superficial structure of the eye anæsthetic, is a mydriatic, and paralyses the accommodation. Applied to mucous membrane it blanches the part simultaneously with anæsthesia. Application of an ointment (alkaloid) will remove the pain of eczema, erysipelas, facial neuralgia or shingles, and the irritation of urticaria or pruritus.

Burns and scalds. Brush with a 4% aqueous solution (Hydrochloride) and apply Cocaine ointment on cotton wool or lint.

Fissured nipples; also insect bites. Apply an aqueous solution.

Hay fever, influenza, coryza, bronchitis, spasmodic asthma, laryngitis and pharyngitis. A spray of an aqueous solution to relieve irritability of mucous surface.

Spasmodic and painful affections of the vagina. May be minimised by vaginal injections of $\frac{1}{4}$ grain in 1% oily solution.

In dentistry. For extraction Dental Anæsthetic will be found effectual. For plugging, preparations such as Cocaine-Lanolin, Calorific Fluid, Cocaine-Menthol-Eugenol.

For small operations. Solutions of Cocaine Hydrochloride have been used in excision of the tonsils, cauterising the turbinated tissue of the nose, painting chancres previous to the application of caustics, removing polypi, iridectomy and operation for cataract, squint, and the removal of foreign bodies from the eye. *For the eye* aqueous solutions of Cocaine Hydrochloride 2 to 4% strength and for other purposes 4 to 50% : it is necessary to repeat the application of the weaker solutions. No operation should be commenced within at least 10 minutes of the first application. Injurious effects, either local or constitutional rarely follow its use.

The *nose* may be plugged with strips of gauze soaked in 20% Cocaine solution, to which a few drops of 1 in 1000 Adrenalin have been added. In the *urethra* not exceeding 1% should be used, as absorption is rapid. In the *eye* 1 to 4%.—H. S. Souttar, B.M.J. ii./13,70.

Finger amputation. Cocaine solution 5%, to which 5 minims of Carbolic Acid and 5 minims of Suprarenalin solution 1 in 1000 have been added to each ounce of the solution : never exceeding 90 minims, often less.

Rectal and prostatic pains are relieved by ½-grain suppositories. A rectal injection checks diarrhœa and dysentery.

Whooping Cough often well treated by Cocaine by the mouth, *dose* being on the basis of 1 grain *ter die* for an adult.

Also of value by painting the external auditory meatus and membrana tympani with a pigment. ℞ P1 **Pigmentum Cocainæ et Hydrargyri Perchloridi.** Cocaine Hydrochloride 28 grains, solution of Mercuric Chloride 20 drops, Glycerin 4 drachms, Water 4 drachms, after syringing ears twice or thrice daily with Boric Acid lotion.

For hay fever, Herbert Tilley warns that it may generate Cocaine craving.

Cocaine 5 Gm. instead of 0·5 Gm. injected into a horse's fetlock. Operation performed. Sweating after about three hours but no violent Cocaine poisoning. Subsequent recovery.—P.J. i./15,109.

Snake bite well treated by large dose—*vide* Snake Bite, Therap. Index.

Deflection of septum operations. Pledgets soaked in Adrenalin solution and 10% Cocaine Hydrochloride, equal parts, then Cocaine injections (5%) into the muco perichondrium.—J. Donald, Pr., April, 1921.

For ear operations as local anæsthetic.—Cocaine Hydrochloride, Menthol, Carbolic Acid, Clove Oil, and Rectified Spirit, equal parts.—F. Pearce Sturm, B.M.J. ii./26,638.

Enucleation of the tonsil under local anæsthetic. For surface anæsthesia a mixture of equal quantities of 10% Cocaine Hydrochloric Solution and Adrenalin Solution used, applied with cotton swabs, and repeated three or four times, followed by infiltration of the tissues, in which the tonsil lies embedded, with a 5% Novocain Solution.—Dan McKenzie, Pr., May, '22/314.

None of the synthetic local anæsthetics equal Cocaine when applied to mucous membrane. Operations should be preceded by Morphine and Atropine hypodermically. In nose operations *Adrenalin* should be applied followed by Cocaine ; injection being made slowly.

In throat operations a 5 to 10% solution should be applied first.

When there is suspicion of possible danger, one fourth of the anæsthetic only should be used and the patient watched for possible toxic effects. Soluble tablets of Cocaine recommended to allow of solutions being as fresh as possible. —Jl. A.M.A., July 31, '20, p. 315, Pres., Feb., '21, p. 39.

As a result of comparative tests Cocaine, on the whole, was found preferable to Butyn for aural work.—L. ii./23,1298.

Cocaine anæsthesia stated to be increased by the **addition of Potassium Sulphate.**—Y.B.P., '24,316. *cf.* Note to Potassium Sulphate and to Stovaine.

None of its rivals appears to have any material advantage over Cocaine.—E. Watson-Williams, Bristol Med. Chir. Jl., Autumn, '25,164, per Pres., April, '26,146.

Better than substitutes, especially in eye work and rhinology.—A. J. Copeland, B.M.J. ii./24,41.

Urethral injection of as little as 20 minims of a 4% solution has ***proved fatal.***—Medical Review, Sept., '28. (Most exceptional we should think.)

Direct contact of 5% Cocaine Hydrochloride solution breaks sensory conduction so completely that the strongest tetanic stimulation peripheral to the anæsthetised area is no longer able to produce response, while the same concentration of anæsthetic leaves motor constriction unchanged for about an hour (Santeson)—a selective affinity for sensory nerve fibres which is a quality of all the Cocaine series.—L. i./30,145.

Le Filliâtre's method of general spinal anæsthesia with Cocaine. Removal of 25 to 30 Cc. of cerebro-spinal fluid, and forcible injection of 2·5 to 3 Cc. of Cocaine Hydrochloride 2%. 10,000 cases reported. —L. i./29,291.

Swabs for applying Cocaine (*e.g.*, the 20% solution for anæsthetising the larynx) should be of ***non-absorbent cotton wool.***—Sir J. Dundas-Grant, B.M.J. i./30,669.

Local Infiltration Anæsthesia is produced by solutions of cocaine (and eucaine, *q.v.*). Its action commences in three minutes, increases for ten to twenty minutes, and mostly disappears within half an hour. The anæsthesia may be prolonged by applying a triangular bandage when possible above the site of injection; this has also the advantage of lessening the risk of toxic symptoms, as the delay of cocaine (and eucaine) in the tissues renders it innocuous.

Cocaine and Adrenalin are used together.

For infiltration a 0·01% solution of Cocaine with 3 to 5 drops of Adrenalin solution 1 in 1,000 to each 100 Cc. is sufficient.

(**Sterules** of the two are prepared.)

Experimentally, an anæsthetic dose of Cocaine or Novocain has *no effect on the heart*, but with Adrenalin added the heart's action becomes slower and diminished in intensity. Hypertonic injections may be the cause of after-pain.—F. N. Doubleday, L. i./25,437,451.

Lumbar Puncture Anæsthesia with ½% solutions, is occasionally practised for major operations. Further details, 17th Edn.

Cocaine Ionisation, *see* Iontophoresis, Vol. II.

Cocaine in Dental Extractions.

Ⓟ Ⓕ 1 Dental Anæsthetic—*Martindale,* is used as a local anæsthetic for extraction. It contains 0·85% Cocaine base and Iodine in the requisite chemical combination, together with hæmostatics and is harmless in action.

Dose.—The amount used varies with the number of teeth to be removed. In view of the fact that ½ grain of Cocaine should not be exceeded, 50 minims may be considered a maximum. The usual dose may be put at 10 to 25 minims.

The injection is made alongside the teeth to be extracted. Some transitory swelling of the gums may be expected after all local anæsthetics.

(The *British Pharmacopœia* 1914 gives ¼ to ½ grain approx. as an ordinary hypodermic dose in the Hypodermic Injection of Cocaine).

The Dental Anæsthetic contains nothing of the nature of Adrenalin, but a small dose of the 1 in 1,000 solution *may be added at the time of use if excessive hæmorrhage be feared,* or it may be injected afterwards in severe operations to arrest primary or secondary hæmorrhage. See also Hæmorrhage, Dental, Therap. Index.

A user of this preparation (P.G.) wrote us (May,'27):

"I have much pleasure in endorsing the remarks in my letter sent to you in 1916, that I had at that time extracted hundreds of thousands of teeth with the anæsthetic without even one unsatisfactory operation. During the 10 or 11 years that have elapsed since sending that letter, I may state that *if* 50,000 *extractions were added this would be a very moderate and certainly underestimated number up to date,* and on every occasion the anæsthetic has done everything I could have wished for.

"Before commencing an operation I always examine most carefully the tooth or teeth to be extracted, and the gums, and at the same time question the patient for information.

"After touching the gums with a little Dentalone or Iodine, I rest the bevelled edge at the point of the needle firmly against the gum and commence pressure of Anæsthetic. In this way, neither the operator nor the patient realises when the point of the needle has penetrated the gum, but the bleaching will show that it has taken effect, and at this stage the needle can be injected as far as desired without causing any pain to the patient. The injection should be slow and steady. Although the Anæsthetic will retain its effect for some time, there is no need to wait as is necessary with some local anæsthetics. After passing the beaks of the forceps through a flame, I proceed to complete the extraction."

Some operators make a practice of spraying the cavity after removal of the tooth, with a little 20 volume **Hydrogen Peroxide.**

The following injections have been recommended :—

Cocaine Hydrochloride 3 grains, Solution of Adrenine (1 in 1,000) 1 drachm, Solution of Hamamelis 7 drachms; also Eucaine 6 grains, Phenol 5 grains, Solution of Hamamelis 1 ounce.—P.J. ii./09,96. 20 minims of the former contain ⅛ grain Cocaine Hydrochloride.

(As much as 20 minims of a 10% solution,—10 minims either side of the tooth at 5 minutes interval = 2 grains of Cocaine Hydrochloride has been given, but this must be considered excessive.)

Notes on Tooth Extraction.

A 1% solution should be used, 15 to 20 minims of which gives the best results. Congestion always follows the use of Cocaine, and in most preparations Adrenalin (which is also vaso-constrictor) is added to prolong the insensibility and localise the anæsthetic. The injection should be made slowly and as few pricks with the needle as possible. Never push the needle too deep, for injury of the periosteum of the bone with the needle point may be one source of trouble. Rapid injection must be avoided, and never inject into any but healthy tissue. If the gum is septic, cleanse round the tooth to be extracted with some antiseptic on cotton-wool. Use a thoroughly sterilised syringe in good working order. In injecting there should be resistance to the pressure on the piston. Reinsert the needle if resistance is not met with. If the fluid goes into the gum too easily, it may be due to passage into loose cellular tissue, and this sometimes causes after swelling. There should be little danger of cellulitis, sloughing, or necrosis if the above instructions are followed out.—C.D.

℞ ℙ 1 **Injectio Cocainæ Hypodermica, St. Bart.'s H.**

Cocaine Hydrochloride 4½ grains, Potassium Iodide 2½ grains, Thymol ½ grain, Oil of Gaultheria ½ minim, Adrenalin Hydrochloride ½ grain. Distilled Water to 1 ounce. For dental purposes.

The addition of Adrenalin to a ¼% Cocaine solution found to increase its toxicity in proportion to the amount added.—Brit. Dent. Jl., Nov. 15, '23, 1289, P.J. i./24,81.

℞ ℙ 1 **Calorific Fluid** for dental use.

Cocaine Hydrochloride 1, Camphor 10, Clove Oil 4, Ether 25, Chloroform 30, Absolute Alcohol 30.

℞ ℙ **Aurinaria Cocainæ Hydrochloridi.**—Ear Cones, contain $\frac{1}{10}$ grain in each with Cacao Butter basis.

℞ ℙ **Guttæ Cocainæ Hydrochloridi, R.O.H.,** 8 or 16 grains to 1 ounce. R.N.H. 2%.

℞ ℙ **Guttæ Cocainæ cum Adrenina.**

Cocaine Hydrochloride 5% in Adrenin Solution (1 in 1,000).

℞ ℙ **Injectio Cocainæ Hypodermica** (*B.P.* '14).

Cocaine Hydrochloride 1 in 20 in dilute Salicylic Acid solution (0·15%).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Fr. Cx. 1% directed to be sterilised at 110° C. for 10 minutes.

A solution up to the strength of 50% may be prepared in salicylic acid solution 0·15% strength, which is nearly saturated.

The *B.P.* '98 injection was *hypertonic.* Should be *hypotonic* as it would then mix more readily with the lymph, and be carried off more quickly by the lymph circulation. A solution 0·594 Gm. in 10 Cc. is isotonic.—P.J. i./12,357. ***Cocaine Hydrochloride Solutions can be sterilised by boiling.*** Recent confirmation of our view.—P.J. i./31,293 ; ii./31,246. *We deal further with the matter in Vol. II.*

Intravenous use of Cocaine Hydrochloride is ***not suitable for man.***

℞ ℙ **Isotonic Cocaine Eye Lotion.**

Cocaine Hydrochloride 1, Sodium Chloride 1·25, Distilled Water to 100. This is isotonic with the tears with which 1·4% Sodium Chloride solution is isotonic.—Pres.

℞ ℙ **Hypodermic Tablets** are prepared with $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{2}$ grain of Cocaine Hydrochloride in each.

℞ ℙ **Lamellæ Cocainæ, Discs of Cocaine** (*B.P.* '14).

Discs of gelatin, each containing $\frac{1}{500}$ grain of Cocaine Hydrochloride, are for ophthalmic use. Also prepared ℞ ℙ containing $\frac{1}{2000}$ grain in each in combination with ℞ ℙ Atropine Sulphate, (*q.v.*), ℞ ℙ Homatropine (*q.v.*) and ℞ ℙ Physostigmine (*q.v.*).

℞ ℙ **Pastillus Cocainæ Hydrochloridi.** $\frac{1}{10}$ grain (**0·006 Gm.**) in each (or more if ordered). To allay throat irritation and hoarseness. Also made ℞ ℙ $\frac{1}{15}$ grain with **Morphine** $\frac{1}{30}$ grain.

℞ ℙ **Pilula Cocainæ Hydrochloridi.** $\frac{1}{5}$ grain (**0·012 Gm.**) in each (or more, if ordered), with milk sugar.

℞ ℙ **Nebula Cacainæ Hydrochloridi.**—May be prepared 1, 5 or 10%, or more if ordered, with sterile 'Normal Saline' for general use.

Sprays for Cocaine Solutions should have fine aperture for the jet.

℞ ℙ **'Sterules,' Ophthalmic** are prepared containing Cocaine Hydrochloride Solution 10 grains to the ounce (2·3%).

For general purposes ℞ ℙ **Large 'Sterules'** (Tube form) are prepared containing 10 minims of Cocaine Hydrochloride Solution 5% and 10% strength, *vide* also Index for **Sterules, Hypodermic.**

℞ ℙ **Hypodermic 'Sterules' of Cocaine Hydrochloride** $\frac{1}{3}$ grain, with **Adrenalin** $\frac{1}{10000}$ grain are prepared for painless dental extraction.—(*cf.* Adrenalin).

℞ ℙ **Suppositories** and **Pessaries** $\frac{1}{2}$ grain (**0·03 Gm.**), or more. S.H. 1926 has Pessus 1 grain in 2 drachms.

℞ ℙ1 **Injectio Cocainæ et Sodii Bicarbonatis.** Cocaine Hydrochloride $\frac{1}{2}$, Sodium Bicarbonate $\frac{1}{2}$, Chloretone $\frac{1}{4}$, Distilled Water to 100.

Dose.—2 to 4 drachms (**8 to 15 Cc.**) for *urethral injection.*

This solution is remarkably efficacious for use prior to passing a catheter. According to our experiments the fact of the Cocaine being in part in the *basic* condition renders the solution more efficacious and anæsthetic in effect than a solution of even 4% or 5% Cocaine Hydrochloride, employed in a similar manner. *See also* **'Activated Alkaloids.'**

℞ ℙ1 **"Sterules" of Cocaine Hydrochloride, Sodium Bicarbonate and Chloretone (Dry Powder)** contain the constituents to produce 1 ounce of the injection on dissolving in distilled water.

℞ ℙ1 **Compound Cocaine Suppository** of Cocaine $\frac{1}{6}$ grain with Morphine $\frac{1}{2}$ grain (Hydrochlorides) is useful for painful hæmorrhoids.

℞ ℙ1 **Tabellæ Cocainæ,** Cocaine Tablets, $\frac{1}{8}$, $\frac{1}{10}$, and $\frac{1}{20}$ grain with chocolate. The usual dose is $\frac{1}{20}$ grain.

Dose.—1 every quarter, half-hour or hour, quickly eaten and swallowed. Useful for sea-sickness (chloroform or alcoholic sickness) and that of pregnancy.

Sea-sickness may be overcome by internal use of the following :—Cocaine Hydrochloride 0·2 Gm., Iodine Tincture 2 Cc., Water to 150 Cc.—*Dose,* 1 tablespoonful 2 to 4 times daily. More palatable without the Iodine.

℞ ℙ1 **Pastilli Cocaini Hydrochlorici,** P. Jap. IV.

Contain Cocaine Hydrochloride 0·005 Gm. (1/12 grain) with Milk Sugar 0·245 Gm. (4 grains approx.) in each.

℞ ℙ1 **Syrupus Cocainæ.** Hypodermic injection of Cocaine Hydrochloride (*B.P.* '14) 44 minims, Syrup of Orange Flower to 1 ounce. *Dose.*—1 drachm=$\frac{1}{4}$ grain.

℞ ℙ1 **Trochisci Cocainæ Hydrochloridi.** $\frac{1}{12}$ grain (**0·005 Gm.**) in each. **T.H.** has $\frac{1}{10}$ grain. Brompton H. 1/6 grain in 20 grains.

℞ ℙ1 **Cocaine Hydrobromide also Hydriodide, Sulphate** (deliquescent), and **Lactate** (white amorphous mass) are sometimes used instead of the Hydrochloride with the same dose.

℞ ℙ1 **Cocaine Periodide.** $C_{17}H_{21}NO_4.3I=683·9678$.

Dose.—1/40 to 1/20 grain (**0·0015 to 0·003 Gm.**) increased with care.

When made by the interaction of Cocaine Base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained in dark purple crystals containing 44·3% Cocaine.

The Periodide was made in the author's laboratories (1923).

This true Periodide is of interest as, in common with others, *e.g.,* Emetine and Quinine, it *retains* its Alkaloid in the presence of Physiological Acid, but liberates it readily to Physiological Alkali (1·5% and 15·7% of the Periodide respectively to each solution).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and insoluble in Ether and water.

Incompatible with alkalis, metal compounds and otherwise as alkaloids.

Uses.—Internally, it is suggested in sickness and abdominal pain. The fact of the compound passing through the stomach

practically unaltered suggests its possible utility in duodenal ulcer or other painful affections of the bowel. The local antiseptic action of the Iodine liberated may also be of value.

Dispensing Note.—To be given alone in cachet or 'slipule' (No. 5), preferably after food.

℞ ℙ1 **Cocainæ Nitras,** Cocaine Nitrate, P.G. VI.

$C_{17}H_{21}NO_4.HNO_3$=366·1876.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

In large colourless crystals, readily soluble in water. Is compatible with silver nitrate, and if used previously in solution lessens the pain caused by the latter salt.

℞ ℙ1 **Cocaine Nitrite** is also prepared for use in an anti-asthmatic spray (*vide Tucker's Asthma Cure, Vol. II.*).

℞ ℙ1 **Cocainæ Phenas.** *Syn.* **Cocaine Carbolate.**

Dose.—In pill $\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

A slightly soluble pasty compound, used by dentists and given for gastralgia.

Strongly antiseptic and may be used on cut surfaces, as its coagulating effect on albumen prevents too rapid action.

℞ ℙ1 **Cocainæ Salicylas,** $C_{17}H_{21}NO_4.C_6H_4.OH.COOH$=441·2186.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**). Is in minute snow-white crystals, very deliquescent; it forms a solution which keeps well. ***Soluble*** 5 in 1 of water, $2\frac{1}{2}$ in 1 of alcohol 90%. In spasmodic asthma, the hypodermic injection of a full dose at the beginning relieves the attack.

Other Salts, *e.g.*, the **Citrate** and **Formate** are in occasional use.

Cocaine Addiction.

Cocaine fascinates by the rapidity with which it relieves exhaustion and dispels gloom by producing a delightful sense of mental and physical vigour. The habit, according to the late Prof. W. E. Dixon, B.M.J. i./23,545, is not common. News reports concern rather cases of users of the drug for specific purposes than addiction. The discomforts caused by Cocaine are readily controlled by Morphine. When the patient learns this, the addiction becomes confirmed. **Atropine,** or better, **Hyoscine** is the ***best for treatment of Addiction*** of all kinds. De Quincey found benefit from **Valerian.**

COCAINE SNIFFED UP THE NOSE is readily absorbed. It first powerfully stimulates the brain—the flagging nerve cells are whipped into activity and lassitude and fatigue pass, but a marked depression of the central nervous system succeeds. Abstinence symptoms are less severe than in the case of Morphine. It can be cut off at once.—W. E. Dixon, B.M.J. ii./21,821.

In Cocaine addiction, $\frac{1}{4}$ grain produces very little effect on an ordinary person, $1\frac{1}{2}$ grains is usually well tolerated, and the total dose varies between 8 and 23 grains. The action of the drug varies greatly with different individuals and when death results it is due to sudden paralysis of the central nervous system. The 5% B.P. Injection is too strong, the FR. CX. 1% solution is quite strong enough.—W. E. Dixon, Society for the Study of Inebriety, B.M.J. i./24,765.

The public ought not to be deprived of commodities or services because of possible abuse of them by invincibly ignorant, incurably stupid, culpably careless or evilly disposed persons.—P.J. ii./24,332.

FORTY YEARS IN THE PROFESSION AND NEVER SEEN A DRUG ADDICT.—Legislation gone mad. Faddists and cranks passing vexatious laws because few degenerates have tried to get a new sensation out of a useless life by taking drugs.—E. E. Duffy, B.M.J. ii./26,408.

While the U.S. official figures show the use of Cocaine is diminishing, and in England it does not appear to be increasing, in Germany and Switzerland the habit appears to be spreading very fast.—B.M.J. i./26,487.

℗ SYNTHETIC COCAINE. Possibilities of industrial production as outcome of Willstätter's work.—B. & C.P., Feb. 1924.

Synthetic drugs not so habit-forming as Cocaine and Morphine.—GENEVA CONFERENCE, LEAGUE OF NATIONS, B.M.J. i./22,724,728.

(*For further on the Geneva Conferences, see p.* 623.)

Drug addicts in Cairo and the East generally.—B.M.J. i./30,208.

There is a general ***antagonism between Morphine and*** small doses of ***Cocaine*** and for moderate depression from Morphine, Cocaine is a fairly effective antidote. This is well ***known to addicts.*** It only applies to small doses of Cocaine, larger doses are synergistic, and 10 mgr. hypodermically should not be exceeded.—Jl.A.M.A. i./29,1473.

Prevention and treatment of drug addiction. Smuggling and the ***"Yellow" Press. Mis-use of Cocaine in England nil.***—E. Mapother, B.M.J. i./31,495.

La Cocaine, by Courtois-Suffit (Masson & Cie, Paris) may be consulted.

See also paragraphs under ***Morphine Habit, Abuse of Opium.*** *Consult also* ***Dangerous Drugs Acts*** (Departmental Com. on Morphine, etc.), Addiction, p. 628, and Vol. II. (*Septum perforation*, ***Harrison Federal Law,*** etc.).

℗ **Tropacocaine.** *Syn.* BENZOYL-PSEUDO-TROPINE.

Obtained from Java Coca. The **Hydrochloride** (P.G. VI.) $C_8H_{14}NO.C_6H_5CO.HCl = 281{\cdot}621$ is freely ***soluble*** in water, has M. pt. 271° C., and is a powerful anæsthetic; in the eye causes neither ischæmia nor irritation of hyperæmia. 3% solution recommended; anæsthesia quicker than with Cocaine, but more transitory; the action may be kept up by adding a drop from time to time. Mydriasis occurs occasionally but is slight. Injection into gums in large doses only affected pulse for 10 minutes and did not affect respiration. Aqueous solutions keep well and can be boiled with impunity.

Sciatica (severe). Tropacocaine 1 Cc. of 5% solution injected into the dural sac in the lumbar region. Complete cure and no recurrence of pain.

℗ **Tablets (Hypodermic)** contain $\frac{1}{30}$ grain.

Intraspinal Anæsthesia by Tropacocaine.

For operating in hernia, fistula, hæmorrhoids and amputations.

Five per cent Neutral Solution in Normal Saline—Sp. Gr. 1·016—employed, *i.e.*, 20 minims of this solution is suitable for a healthy person weighing about 11 stone. *Maximum dose* 24 minims. For a child 1 year old 4 minims is enough. After a lapse of 40 to 50 minutes a second injection of 8 to 12 minims is given if required. 1,295 cases treated with this method at Queen's Hospital, Birmingham.—J. T. J. Morrison, B.M.J. i./13,1306.

ECLAMPSIA treated with spinal anæsthesia—1·8 Cc. of Tropacocaine solution—strength not stated, after chloroform had been given.—R. H. Paramore, B.M.J. i./30,15.

Benzamine Hydrochloride, *Syn.* **Betacaine, *Eucaine Hydrochloride,** Eucaine or Eucain B., Benzoyl-vinyl-diaceton-alkamine or Trimethyl-benzoxy-piperidin Hydrochloride, U.S. X., P.G. V. not in VI.). P. Helv. $C_5H_7N(CH_3)_3(C_6H_5COO)$. HCl=283·6416.

TRADE MARK: EUCAINE, 193242 of 1896. Registration renewed 1924.

PATENT: 20697 of 1896. Became void in the twelfth year. Now public property.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) or more.

A synthetic compound allied to Cocaine, in small white opaque crystals, ***soluble*** about 1 in 30 of water (Crystals may deposit on cooling which can be redissolved without harming the salt). 2% solutions are used in ophthalmic work. Solutions may be boiled without decomposing the salt.

Sterules, Hypodermic contain Eucaine $\frac{1}{4}$ and $\frac{1}{2}$ grain. For dental extraction.

Local Infiltration Anæsthesia (*Barker*) with Eucaine is suitable for very short operations:—

Eucaine and Sodium Chloride Sterules are prepared for producing the 1 in 500 solution for infiltration, containing Eucaine 3 grains (**0·2 Gm.**) and Sodium Chloride 12 grains (**0·8 Gm.**) to produce $3\frac{1}{2}$ ounces (**100 Cc.** approx.) of solution. This is **isotonic.**

The solution is boiled and on cooling 10 minims of Adrenalin Solution may be added. In the operation 50 Cc. or more (up to 100 Cc.) is injected all round the region to be dealt with. *See also* **Barker's Stovaine-Glucose Solution** and **Novocain Solution.**

Nebula Eucainæ.

Eucaine 10 grains, Sodium Sulphate 4 grains, Distilled Water 1 ounce.

Adreucaine Sterules contain Eucaine $\frac{1}{120}$ grain and Adrenalin $\frac{1}{4000}$ grain in 8 minims ($\frac{1}{2}$ Cc.), for dental and surgical use. For tooth extraction the contents of one (or two) sterules are injected into the gums ten minutes before operating.

Tablets of Eucaine are made $\frac{1}{10}$ grain (**0·006 Gm.**) for internal use.

Unguentum Eucainæ.

Eucaine 1, Olive Oil 2, Hydrous Wool Fat 7. For pruritus, Menthol 2% may be added.

Benzaminæ Lactas (*B.P.* '14) *Syn.* EUCAINÆ LACTAS.

$C_{15}H_{21}O_2N.CH_3CHOH.COOH$=337·2186.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain. (**0·008 to 0·03 Gm.**).

A white crystalline salt with M. pt. 155° C.

Soluble about 1 in 5 of water and about 1 in 8 alcohol (90%).

Incompatible with salicylic acid.

For ophthalmic work and in dentistry employ 2 to 3%; for infiltration 0·1% with Sodium Chloride 0·8%; for regional anæsthesia 2·5%; nose, throat and ear 10 to 15%. Solutions can be boiled.

Slower in action than cocaine, less toxic, and anæsthesia more prolonged, while the heart is not affected, nor the pupil dilated.

Sciatica has been treated by injections.

Urethral Injection. 1 to 2% solutions may be used to relieve pain.

Sterules (Hypodermic) of **Eucaine Lactate** ¼ grain (**0·016 Gm.**), also ½ grain (**0·03 Gm.**).

Holocain Hydrochloride. *Syn.* **Phenocain.**

$CH_3C\begin{matrix}=N.C_6H_4.OC_2H_5\\ \diagdown NH.C_6H_4.OC_2H_5,\end{matrix}$ HCl=334·6574.

The Hydrochloride of para-diethoxyethenyl-diphenylamidine in small colourless shining crystals.

Soluble 1 in 55 of water. ***Incompatible*** with Alkalis.

Guttæ Holocain R.O.H. 4 grains to ounce.

As an anæsthetic in ophthalmology, 2 to 5 eye drops of 1% solution, but it is *not adapted for hypodermic use.*

Sterules of Holocaine Hydrochloride Solution 1% are prepared.

***Alypin.** (T.M. 322518). *Syn.* **Amydricaine, Benzoyl-tetramethyl-diamine-ethyl-di-methyl-carbinol Hydrochloride.** P.G. VI.

$C_6H_5COC_2H_5CO.[CH_2N(CH_3)_2]_2HCl$=314·6836.

Dose (Internally).—$\frac{1}{20}$ to ½ grain (**0·003 to 0·03 Gm.**).

Crystalline powder melting at 169° C. ***Soluble*** in Water 1 in 1 and 1 in 4 Alcohol 90%.

Solutions 0·025 to 0·5% or up to 10% (strong solutions keep well, but weak ones may become cloudy ; may be sterilised by boiling), efficient in eye work.—2% strength produces insensibility of cornea in sixty seconds. Non-toxic. It produces no mydriasis nor disturbance of accommodation.

For lumbar anæsthesia has been used in ¼ to 1 Cc. injections of 2% solution.

For infiltration 0·01 to 0·1% solution has been used with same quantities of Cocaine Hydrochloride in 0·2% Sodium Chloride Solution.

In sickness and post-operative vomiting internally it acts like Cocaine.

***Alypinoids** (T.M. 291929, 322519) **D. Tablets** ⅓ grain (0·02 Gm.) with Suprarenin 1/5,000 grain dissolved in 1 Cc. water produce a 2% solution suitable for use in *dentistry* and minor surgery.

Aminobenz, '*Orthoform, New,' the Methyl ester of *Meta*-amido-*para*-oxy-benzoic Acid (Methyl-amino-oxybenzoate P. Helv.).

$C_6H_3.NH_2OH.CO.OCH_3$=155·0782.

T.M. : ORTHOFORM, 215951/1898, since renewed.

PATENTS : 12,179/1897 and 22,106/1898. Both ***Expired.***

Manufacture.—See Edn. XIX., p. 345.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) for stomach ulceration.

A white crystalline powder, possessing local analgesic and antiseptic properties. Is slightly soluble in water, in alcohol 90% 1 in 7.

The **Hydrochloride** $C_6H_3.OH.NH_2COOCH_3,HCl$=191·573 is soluble about 1 in 9 of water ; action of base is more prolonged.

A 10% aqueous solution of the hydrochloride is used, or 10 to 20% with lanoline or paraffin ointment or collodion solution of pure orthoform, or this as a dusting powder, may be employed to alleviate pain in sores or burns, but has little action unless there is a breach of surface.

Has relieved whooping-cough and laryngeal tuberculosis by insufflation.

Insufflatio Orthoformi cum Resorcin, C.L.T.E. Resorcin 2½ drachms, Orthoform to 1 ounce.

Orthoform Bougies 5%, 4 inches in length with Cacao Butter basis, are prepared.

***Kerocain** (T.M. 373550). *Syn.* *Novocain (T.M. 276477), *Planocaine (T.M. 496218) **Para-Amino-Benzoyldiethyl-Amino-Ethenol Hydrochloride.** Fr. Cx. Supp. 1920. P. Ital. V., P. Jap. IV., P. Argent. II., P.G. VI., Ph. Ned. V., P. Svec. X., Ethocaine, F.E. VIII., Allocain, Syncaine, Procaine, P. Belg. IV., Procaine Hydrochloride U.S. X.

*Aethocaine is T.M. 389240.

$C_6H_4(NH_2)[CO_2.C_2H_4N.(C_2H_5)_2]HCl = 272{\cdot}637$.

Dose, subcutaneously.—$\frac{1}{5}$ to 1 grain (**0·012 to 0·06 Gm.**).

Max. Single Dose per os (Fr. Cx. Supp., 1920) 0·1 Gm. ($1\frac{1}{2}$ grains); *Max. during 24 hours* 0·25 Gm. (4 grains).

A colourless crystalline salt melting at 156° C. Soluble 1 in 1 of water. In absolute Alcohol about 1 in 30. A cocaine substitute. 0·25 to 2% solutions are for hypodermic use.

Incompatible with Alkalies, Tannin, Calomel, Potassium Dichromate, Potassium Permanganate and Silver Salts. With the latter use Novocain Nitrate, *s.a.*

Uses.—A powerful local anæsthetic, but its effect is very transient. A drop of 5% solution anæsthetises the conjunctiva sufficient for superficial operations. It is well tolerated by the tissues, but has been called a poor substitute for cocaine.

Infiltration Anæsthesia has been practised by 200 Cc. of 0·5%. Solution in Normal Saline—a maximum dose—this is sufficient to anæsthetise the area for most operations. 50 to 75 Cc. is enough for a moderate size elbow. 150 Cc. for a knee.

The following **Tablets** are prepared with addition of Adrenalin :—

A.) For Infiltration Anæsthesia of Thick Layers of Tissue and Hypodermic Injections in General Surgery.

Novocain 0·125 Gm. Adrenalin 0·000125 Gm.

Dose.—One tablet dissolved in 25 Cc. Normal Saline Solution makes a ½% Novocain Solution. *Max. dose.*—125 Cc.

(B.) For Anæsthesia of Nerve Centres and Larger Nerves (Local Anæsthesia).

Novocain 0·1 Gm. Adrenalin 0·00025 Gm.

Dose.—One tablet dissolved in 5 Cc. Normal Saline Solution makes a 2% Novocain Solution. *Max. dose.*—5 Cc.

C.) For Spinal Anæsthesia.

Novocain 0·05 Gm. Adrenalin 0·000083 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 5% (Isotonic) Novocain Solution. One to 3 Cc. may be used.

(D.) Without Adrenalin.

Novocain 0·2 Gm. Sodium Chloride 0·09 Gm.

Dose.—One tablet dissolved in 10 Cc. sterile distilled water makes a 2% Novocain Solution.

(E.) Dental Tablets.

Novocain 0·02 Gm. Adrenalin 0·00005 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 2% Novocain Solution. 1 to 2 Cc. for one or two extractions.

Novocain Dental Solution (2%). *Dose.*—1 to 2 Cc. is also prepared :—

Novocain 0·02 Gm. Adrenalin Solution (1 in 1,000) 1 drop. Sodium Chloride 0·006 Gm. Thymol 0·0006 Gm.

(F.) Without Adrenalin.

Novocain 0·05 Gm.

One tablet dissolved in 1 Cc. Normal Saline Solution gives a 5% Novocain Solution.

Fischer's Modification of Ringer's Saline Solution (*q.v.*) is sometimes used instead of Normal Saline Solution for the above.

Atropine is the best drug to combine with Novocain and Adrenalin to ***prevent the effects of Adrenalin*** poisoning. Adrenalin has a definite depressant action on the heart.—F. N. Doubleday, B.M.J. i./25,455.

In general anæsthesia, local infiltration of the operation area with Novocain is very important.—J. Ross Mackenzie, L. i./27,165.

Injectio Novocainæ et Adrenalin, R.O.H.—Novocain 8 grains (2% approx.), Adrenalin Solution 2 drachms, Sterilised Distilled Water to 1 ounce.

Dose.—Up to 1 drachm of the 2%.

In eye work may be employed, *e.g.*, for excision of the lachrymal sac, and for other minor operations.

Toxic symptoms during use of Novocain. 2 drachms of 1% Solution with ¾ minim of 1 in 1,000 Adrenalin Solution caused the pupils to be widely dilated and fixed. Consciousness had gone and a cold, clammy sweat broke out. Pulse slowed, body became rigid for fully a minute. Recovery with Strychnine. —L. i./13,561. Death from use in dental work.—B.M.J. ii./10,2052.

Solutio Novocainæ, St. Th. H. ½ to 10% in Saline.

Solutio Novocainæ Composita, St. Th. H. *Syn.* DUNHILL'S SOLUTION, Novocain 3 grains, Adrenalin Solution 7½ minims, Sodium Chloride 14 grains. Water to 3½ ounces.

Solutio Novocainæ et Adrenalini.
Novocain 4, Adrenalin Solution 10, Water to 100.

Sterules, Hypodermic of Novocain, ⅕ grain (0·02 Gm.), also **Novocain** ⅓ grain (0·02 Gm.), **with Adrenalin** 1/1,000 grain in 15 minims (1 Cc.) are prepared.

Spinal Anæsthesia with Novocain. 5% solution with Mannitol. Dose varied from 0·06 to 0·08 Gm. of Novocain. No safer than Stovaine and larger dose has to be used.—C. C. Holman, L. i./16,955.

Should be reserved for adults, and should not be used in the tuberculous, the syphilitic, or in nervous cases. Specially suitable for operations below the umbilicus.—Brissot (Paris), per Pres., June, '29,219.

High spinal anæsthesia with injection of 15% Novocain 1 Cc. mixed with 8 Cc. of the patient's cerebro-spinal fluid. After turning patient over, 50 mgr. ***Ephedrine hypodermically.*** In 10 minutes surgeon may commence—he must complete in an hour. Need of a drug to prolong anæsthesia. —C. A. Pannett, L. i./29,1195. 2% Novocain in 0·9% Sodium Chloride with 1 in 10,000 Adrenalin good for plastic operations of 2 to 3 hours.—C. Abbott-Brown, L. i./29,1278. Adrenalin should not be used intradurally.—C. A. Pannett, *ibid.*, 1332.

Spinal analgesia with Novocain the anæsthetic of choice at the Mayo Clinic for almost all abdominal operations.—I. W. Magill, L. i./31,353.

Barker's method of Stovaine-Glucose is not used so much now. Novocain is less toxic—the least toxic of known local anæsthetics. Raising blood pressure by **Ephedrine** injection simultaneously leads to rapid absorption and diminishes the anæsthetic effect. High spinal anæsthesia has many advantages (using 1 to 1·2 Cc. of 10% Novocain), and is safe if careful technique followed.—Prof. C. A. Pannett, L. i./29,271,291 ; *see also* W. Howard Jones, L. i./29,362, and Reply, *ibid.*, 416.

Planocain, Ethocain and Novocain in spinal anæsthesia.—B.M.J. i./30,1154 ; ii./30,43.

Deaths under spinal anæsthesia. Neocaine (Novocain) mentioned.—Jl. A.M.A., Aug., '30,234 ; L. ii./30,650.

Sterules of Novocain 0·15 Gm., Caffeine 0·12 Gm., Sodium Benzoate 0·15 Gm. in Water 3 Cc.

Dose.—2·5 Cc. of the contents.

In spinal anæsthesia the depressing effects have been prevented by the use of Caffeine. The amount should not be sufficient to mask the effects of the drug.

A case is reported in which a man of 71 who collapsed whilst undergoing prostatectomy under spinal anæsthesia, recovered on the injection of 0·25 Gm. Caffeine into the spinal subarachnoid space. 15 minutes' artificial respiration had been unsuccessful.—M.P.C., Mar. 14/23, p. 208.

***Spinocain** (T.M. 494893). Each 2 Cc. ampoule contains 0·2 Gm. Novocain, 2·2 mgr. Strychnine Sulphate, and 14½% Alcohol in Normal Saline. It also contains Gliadin or Amyloprolamin.

It has been termed a controllable spinal anæsthetic by the introducer. Gliadin (of Starch) is stated to prevent diffusion in the subarachnoid space until the anæsthetic has been absorbed.—G. P. Pitkin, B.M.J. ii./29,183; *see also* F. A. Kelly, *ibid.*, 187, and L. ii./29,825.

The amount stated is mixed with more or less cerebro-spinal fluid as required, and after injection the table is tilted to direct it to any region desired. In the circumstances of a modern operation a large fall of blood pressure is not greatly to be feared. ***Jonnesco gave up Strychnine after 15 years' trial.*** A similar solution to Spinocain, but without the Strychnine, gave equally good results. An operation of 1¾ hours done under it. No evidence to show that addition of Dextrin is not as good as Gliadin.—E. Falkner Hill, L. i./30,124.

Criticism of Pitkin's method.—L. Shillito, L. ii./29,898.

Thought to be an improvement on Stovaine, the use of which was often followed by collapse.—C. L. Granville Chapman, B.M.J. i./30,799; *see also* R. A. Grant, B.M.J. i./30,1090.

Spinal anæsthesia with Spinocain, using Ephedrin-Novocain first. 250 cases.—A. Wilfrid Adams, B.M.J. i./31,785. Death under.—A. Wilfrid Adams, *ibid.*, i./31,869.

3 Cc. dose of Spinocain reserved for cases requiring increased duration.—A. Wilfrid Adams, B.M.J. i./31,955.

Most of Pitkin's claims unsubstantiated.—C. Donald, P.R.S.M. '30, per M.A. '31,31.

Regional Anæsthesia is a form of local anæsthesia, using a stronger solution than that for local infiltration. A small quantity is introduced round the nerve trunks, which supply the parts to be operated on at some part of their course, which is anatomically accessible. This form of anæsthesia has been effected with a Solution of Novocain 2, Sodium Chloride 0·5, Distilled Water 100. Five drops of a 1 in 10,000 Solution of Adrenalin are added to each 20 Cc. of Solution immediately before use.—For Technique, *vide* Felix Rood, B.M.J. ii./12,1701.

Regional anæsthesia with Novocain.—C. Hope Carlton, B.M.J. i./25,647.

Methods described. The multiplicity of punctures necessary, Novocain intolerance, and the psychic factor, are disadvantages, but the technique is regarded as a life-saving measure in the surgery of the old and feeble, and those with cardiac, renal, or pulmonary disease, or diabetes.—Stanford Cade, L. i./25,856.

Of particular value for operations on the thyroid and thorax.—L. i./25,879.

Supraclavicular Anæsthetization of the brachial plexus with 20 Cc. of 2% Novocain Solution, with addition of Adrenalin. Stated to be convenient and free from danger. By its use severe operations on the arm can be performed painlessly and without shock. Definite paræsthesia must be obtained in the arm and hand before the injection is made.—B.M.J. i./13,388.

Warning against use of Epinephrin with Procaine in local anæsthesia.—Paris Med., Oct. 17/25, per Jl. A.M.A. ii./25,1762.

Splanchnic analgesia with Novocain. Advantages are perfect relaxation of the abdominal wall with less shock and fatigue to patient. Disadvantages are the extra 15 minutes time to anæsthetise patient and in some cases post-operative head and backache. Operations may be performed which would not be attempted under general anæsthesia alone.—O. S. Hillman and R. E. Apperly, L. i./25,863.

Upper Abdominal Surgery. Braun's technique modified. The vertebral column between aorta and inferior vena cava is felt just above the pancreas with the left index finger through the lesser omentum. The finger is kept close to the right side of the aorta and the narrow tubular guide of the long fine needle passed along its dorsum down to the vertebra and kept there by the middle finger. The needle is then passed down the guide as far as the bone, aspiration performed to prove the points of the needle not to be in a blood vessel, and 30 Cc. of 1% Novocain solution containing 20 drops of 1 in 1,000 Adrenalin per 100 Cc. injected. The viscera fall back into the abdomen and render it easy to inject a further 10 Cc. of the solution to the left of the aorta behind the œsophagus.

Intra-arterial anæsthesia, by 50 to 100 Cc. of 0·5% Novocain into an artery, circulation being arrested by a tourniquet. Analgesia develops in 1 to 2 minutes.—B.M.J. ii./13,392.

The applications of local anæsthesia are limited only by the anatomical knowledge of the surgeon. There is no operation which cannot be carried out successfully by its means.—H. S. Souttar, B.M.J ii./28,1094.

Before reducing fractures 20 Cc., 2% Novocain injected at the site to anæsthetise bone-ends and adjacent muscles.—D. Levi, Pr., Dec., '30,738.

Cæsarean section. For immediate repair of the perineum. Novocain 4 to 6 drachms of 2% solution with 1 minim of 1 in 1,000 Adrenalin to each drachm of Novocain solution.—(Browne), quoted by A. Louise McIlroy, B.M.J. ii./30,549.

Cranial Injuries in War.—Novocain ¾ Gm., Magnesium Sulphate ½ Gm., in water or saline 100 Cc. Boil and when cold add Adrenalin solution 1 Cc. to each 30 Cc. This amount is usually enough to completely anæsthetise wound area.—J. Anderson, B.M.J. ii./17,42.

Kerocain and Cocaine solutions with Adrenalin in concentrated form for dilution a convenient number of times, *e.g.*, 1 : 40 satisfactory in use. A 15% Sodium Chloride solution is bactericidal; with addition of 7½% Cocaine is slightly less bactericidal and with 7½% Kerocain is still less.—H. Macnaughton Jones, L. i./18,904.

Intrasacral extradural anæsthesia for operations on hæmorrhoids, fistulæ, and other conditions in and about the anus.

Dose.—20 Cc. of 2% Novocain to which five drops of 1 in 1,000 Adrenalin solution is added—the amount of Novocain thus exceeds 6 grains. 15 grains have been used in a local or regional anæsthesia and even 35 grains have been used.—S. R. Meaker, B.M.J. i./19,569.

Local anæsthesia in operations on the anal region effected by injection of solution consisting of Novocain 2%, Adrenalin (1 : 1,000) 1% and Phenazone (Antipyrin) 1%. An average injection of 2 ounces, preceded by hypodermic injection of Morphine 1/8 grain and Hyoscine Hydrobromide 1/200 grain.—E. G. Martin, per Pres, April, '23,147.

Rectal Operations.—A 1 or 2% solution of Novocain satisfactory.—B.M.J.E. i./25,19.

Circumcision.—Infiltration over skin area corresponding to coronary glandis with 2% solution of Novocain and Adrenalin 1/1,000 equal parts, about 10 Cc. being injected, simple and effective.—E. Sutherland-Rawlings, L. i./31,520.

Novocain Suppositories, 1½ grains (**0·1 Gm.**) in Cacao Butter 30 grains are prepared.

Novocain, Identification of, see Vol. II.

Arocan.—Series of local anæsthetics contain Procaine and Adrenalin in various strengths for regional anæsthesia, and for dental and spinal anæsthesia.

***Borocaine** (T.M. 459625). *Syn.* Ethocaine Borate.

$2(C_{13}H_{20}N_2O_2).5B_2O_3.4H_2O$.

Patent.—Manufacture covered by Patent No. 260346 (Sir William Pope), application date July 28th, 1925.

The compound was first investigated by Gros.—Arch.f.exp.Path.u.Pharm., 1912,132.

Criticism of the Patent.—Jl. A.M.A., Jan. 7/28; L. i./28,512. Difficult to discover in its preparation the element of newness essential for the taking out of a Patent.—L. i./28,512.

Not acceptable for N.N.R. on the grounds that the application of a proprietary name to Procaine Borate is not considered to be in the interest of rational therapy.—Jl. A.M.A. ii./29,1309.

Dose.—1/3 to 1½ grains (**0·02 to 0·1 Gm.**). Tablets contain 0·1 Gm. with Adrenalin 0·00025 Gm., Sodium Chloride and Glucose. One in 5 Cc. makes a 2% solution, and in 2 Cc. produces a 5% solution.

Borocaine was introduced as a substitute for Cocaine. Although a salt of Novocain base, it is stated to be more active but less toxic

than Novocain. The difference in properties is due to the fact that Borocaine, being the salt of a weak acid, in solution yields free alkaloidal base by hydrolysis (see " Activated Alkaloids ").

Uses.—For ophthalmic and dental use, for operations on and examination of the urethra and bladder, and for surface anæsthesia in general, 2% solutions are used, and for operations on the nose and throat 5% solutions. (Beta-Borocaine, *v. postea*, is stated to be a better surface anæsthetic.)

An account of the borates of some anæsthetic bases (" borocaines ").—A. J. Copeland and H. E. F. Notton, B.M.J. ii./25,547.

A 2% solution of Borocaine is an improvement on a 0·5% solution of Cocaine, in urethral anæsthesia, and a 1% solution of the former gives better anæsthesia than a 0·5% solution of Cocaine, but a 0·5% solution of Borocaine has no advantage over a 0·3% solution of Cocaine. Beta-eucaine Borate in 0·5% solution is a perfect urethral anæsthetic and the relaxation is perfect. In ¼% its action is equal to ½% Cocaine HCl, but ⅛% is not so good as ½% Cocaine.—R. Coyte, B.M.J. i./26,85.

OPHTHALMOLOGY.—Borocaine greatly inferior to Cocaine as regards surface anæsthetic effect. Cocaine is perfectly reliable, whereas the effect of Borocaine is variable.—T. H. Butler and R. U. Gillan, B.M.J. i./26,84.

***Beta-Borocaine** (T.M. 465359). *Syn.* BETA-EUCAINE BORATE.

$C_{15}H_{21}NO_2.5HBO_2$. PATENT: See Borocaine.

Dose.—3/8 grain (**0·025 Gm.**).

Uses.—A *surface* anæsthetic: Borocaine is preferred for *injection.*

For operative work on the eye, a 0·25% solution is recommended, and for operations on and examinations of the urethra and bladder in general a 0·5% solution is suitable.

Beta-Eucaine Borate has three times the anæsthetic action on the rabbit's cornea, and 1/10 the experimental toxicity of Cocaine Hydrochloride. It is mildly irritant, causes some congestion, especially in the nose, and in very large doses excites the central nervous system.—A. J. Copeland, B.M.J. i./26,82.

Beta-Borocaine Tablets contain 0·025 Gm., with Adrenalin 0·00005 Gm., Sodium Chloride and Cane Sugar *q.s.* One dissolved in 10 Cc. makes a 0·25% solution: one in 5 Cc. makes a 0·5% solution.

Alkcain S.—Ethyl-Mydriatine Hydrochloride. A local anæsthetic stronger than Novocain and weaker than Cocaine. On account of the slight irritation caused by its acid solutions and of precipitation by tissue fluids its use is limited. Adrenalin, Ephedrine, Mydriatin are allied chemically.—S. Kubota, Jl. Pharm. and Exp. Therap., Feb. 1919.

Anesthone—ETHYL PARA-AMINO-BENZOATE. U.S. X., P.G. VI., PH. NED. V., F.E. VIII., P. BELG. IV. PARA-AMIDO-ETHYL BENZOATE; BENZOCAINE. *ANÆSTHESINE (T.M.: 244958/1902, since renewed). $NH_2.C_6H_4.COO.C_2H_5$=165·0938.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in powder or cachets.

Notes on Manufacture.—Edn. XIX., p. 350.

PATENT 16,684/1903 lapsed in 1908. The compound is almost insoluble in water, ***soluble*** 1 in 8 of alcohol 90% also 1 in 50 of Olive Oil and easily in Ether, and Chloroform. M.Pt. 90° C. Has a numbing taste.

General Uses.—To relieve hyperæsthesia of the stomach and dyspepsia: local insufflations sometimes with equal amount of **Orthoform** for pharyngeal and laryngeal affections, bougies for urethritis 3 grains, and suppositories 10 grains for hæmorrhoids. Ointments 10% for burns, eczema, and intertrigo.

Pruritus ani and anal fissure.

'A.B.A.'—Anæsthesin 3, Benzyl Alcohol 5, and Ether 10, in Sterile Olive Oil *q.s.* to 100.

In pruritus ani 10 Cc. may be safely used at the first treatment—injected in relation to the posterior half of the perianal region through 4 punctures, 2½ Cc. at each specified point (provided in a diagram). A week later 5 Cc. are given by 2 punctures, and again another dose after a further week. In the average case, 3 doses—10, 5, and 5 Cc. suffice.

Percain 0·5%, Benzyl Alcohol 10%, Phenol 1%, in 5 Cc. Sterile Oil, also used instead of the above. For *anal fissure* 'A.B.A.' 5 Cc., or the Percain in Oil (5 Cc.) will reduce sphincteric relaxation. Local anæsthetic effect lasts as long as 10 days.—W. B. Gabriel, B.M.J. ii./30,311.

No general reaction or complications. Also gives rapid and brilliant cure in recent anal fissure.—W. B. Gabriel, B.M.J. i./29,1071.

Permanent relief of pruritus ani from subcutaneous injections (round the anal margin) of either **Benacol**—a solution of equal parts of para-amino-ethyl-benzoate and Phenmethylol (*i.e.*, Benzyl Alcohol) in 90 parts of Almond Oil, or 'A.B.A.' as above. 4 Cc. of either may be injected at a time and repeated at 3 to 7-day intervals, till the entire perianal region has been injected, 8 Cc. being the average total injected.—W. B. Gabriel, *ibid.*

A.B.A. valuable for ano-rectal complaints—better than Novocain.—P. Kennedy Murphy, B.M.J. ii./30,162.

Large doses of both oily and aqueous solutions as anæsthetics in pain and fissure should be avoided.—P. Kennedy Murphy, B.M.J. ii./30,498.

Anal fissure treated by 2 to 5 Cc. of 'A.B.A.' injections into the sphincter.—W. J. Lytle, B.M.J. i./31,498.

Pruritus ani and anal fissure, and spasm of the sphincters, treated by A.B.A. Pain relieved instantly.—Arthur S. Morley, B.M.J. ii./30,80.

Anæsthesin Emulsion.

Painted on the larynx affords relief in tuberculosis of the larynx. Menthol 24 grains, Gum Acacia, Almond Oil and Water of each 2½ drachms, emulsify and add Anæsthesin 90 grains, Alcohol 90% 10 drachms, and Water 2 ounces, shake well.—Sir James Dundas Grant, Pr., Aug., '31,260.

Pneumococcic (and tuberculous) infection of the throat—in a case of difficulty in swallowing has been greatly relieved by applications of Anæsthesine dissolved in Palm Oil—in form of a spray.

✱**Rhinoculin** (T.M. 308800) **Cream, Powder** and **Spray** contain: Anæsthesin, Paranephrin, Subcutin, Glycerin and Boric Acid, for use in hay fever.—Gehe.

Anesthone Cream.

Anesthone 10%, Adrenalin Chloride 0·005% in Ointment basis. A quantity the size of a pea applied to the nasal mucosa when necessary gives relief in hay fever and as a palliative in allaying irritation, congestion and inflammation of the nasal mucous membrane.

Anesthone Tape ½ inch wide for "packing" is also made.

✱**Stovaine** (T.M. 261296).—*Syn.* Chlorhydrate d'Amyléine, Fr. Cx. Supp., 1920, P. Ital. V., P. Belg. IV., P. Argent. II., F.E. VIII. Amylocaine, Benzoyl-ethyl-dimethyl-amino-propinol Hydrochloride.

$$C_6H_5CO.C_2H_5.CH_3CO.CH_2N(CH_3)_2.HCl = 271{\cdot}6366.$$

Dose.—*Per os* and hypodermically ⅓ to ¾ grain (**0·02 to 0·05 Gm.**). For lumbar anæsthesia, *dose* from ⅓ to 1½ grains (**0·02 to 0·1 Gm.**).

Max. single dose. Fr. Cx. Supp. 1920.—0·08 Gm. (1⅓ grains approx.); *max. during* 24 *hours* 0·15 Gm. (2½ grains approx.). P. Belg. IV., 0·3 and 0·6 Gm. respectively.

In small white crystals, M.Pt. 175° C. ***Soluble*** (by experiment) in water about 1 in 13, in alcohol 1 in 3, almost insoluble in ether.

Stovaine does not come under regulations of the D.D.A.

Uses.—Anæsthetic (2 to 4% in eye work), vaso-dilating, comparatively non-toxic. It is stated not to cause headaches, nausea, vertigo, or syncope.

For *cauterization*, 5% Stovaine found good in nose, throat, and ear work; 10% used in turbinal operations. In *septum operations* 10% with 1 in 2,000 Adrenalin. *Tonsils* removed with 1% solution, but there was much more bleeding than with Novocain. As a *laryngeal spray* for minor operations 5% solution excellent.—F. Muecke, B.M.J. ii./26,561.

Neuralgias in various forms have been treated hypodermically with Stovaine, *e.g.*, 1 to 2 Cc. doses of 1% Solution in 80% Alcohol along the course of the branches of affected nerves in tic douloureux.

Intraspinal Anæsthesia with Stovaine.

(A.) Stovaine-Glucose Solutions (*mainly.*)

The ideal solution for anæsthesia should produce neither shrinking nor swelling of the blood or tissue cells by osmosis.

A. E. Barker employed 1 *Cc. injections of* 5% *Stovaine with* 5% *Glucose*—without Adrenalin. Often the dose may be reduced to 0·8 Cc., sometimes increased to 1·2 Cc. The Sp. Gr. of this solution is 1·0230. (**Injectio Thecalis Anæsthetica.**—Vic. Park).

Using this solution, a small dose of the drug can be employed and the severest operations performed. By carefully adjusting the curves of the spine, either a high or low anæsthesia can be produced by gravitation. The lowering of the head in any operation is not favoured. The best results are obtained by not altering the level of the body after injection, excepting in cases of the labouring class advanced in life, where the spinal column may be almost rigid—here the pelvis may have to be raised. Usually 5 to 10 Cc. of cerebro-spinal fluid is withdrawn before injection. Any alteration of posture may be made providing the relative levels of head and pelvis remain as before.

The equivalent of 0·06 Gm. Stovaine usually found to be sufficient. As a rule anæsthesia was established in 5 to 7 minutes for the groins and 8 to 10 for the epigastrium. There is almost always pyrexia but no post-operative shock. Longest period of analgesia (using 0·08 Gm.) was 2 hours, largest total dose 0·135 Gm. Highest analgesia—to clavicles.

Review of 500 cases from severest abdominal to an insignificant fistula in ano using Barker's Solution.—L. McGavin and R. D. O'Leary, Pr., Mar. 1912.

The canal is punctured between second and third lumbar interspaces,—patient in sitting posture. 5 Cc. of fluid allowed to escape and then the injection made. Anæsthesia within ten minutes, and lasts for about an hour. Headache following relieved by Phenacetin. Advantages—absence of post-operative shock, complete muscular relaxation, no venous engorgements or respiratory movements, no starvation, and no post-operative sickness. Contra-indicated in cases of advanced sepsis.—C. H. Allen, L. i./13,1100; also W. W. Babcock, L.ii./13,1855; Maj. J. W. H. Houghton, R.A.M.C., L. ii./12,1008.

Spinal analgesia in a variety of operations with Stovaine 0·04 Gm. Sodium chloride 0·0011 Gm., water 1 Cc. Stovaine itself is antiseptic; the solution is heated to 80/90° C. for 10 minutes.—N. M. Bey, L. ii./18,141.

For abdominal operations spinal anæsthesia has very strong claims. It is a gain to have a completely flaccid abdominal wall and quiet thoracic respiration. Barker's heavy solution satisfactory.—J. Morley, L. ii./16,728; P. P. Cole *ibid.*, p. 645 prefers 10% Stovaine solution in Saline.

Stovaine preferred to Novocain.—F. S. Rood, L. i./19,14.

Suprapubic prostatectomy.—Stovaine 10% Solution with maximum dose 0·03 Gm. and without addition of Glucose in spinal anæsthesia.—H. M. Page, L. i./21,800.

ABDOMINAL OPERATIONS.—Spinal anæsthesia with Barker's formula.—A. H. Southam, B.M.J. ii./21,592.

LAPAROTOMY.—2 Cc. doses of Barker's formula.—S. A. Lane, L. i./23,129

Stovaine 10% with Sodium Chloride 10%. *Dose.*—0·75 Cc.—A. Morrison B.M.J. ii./21,1056.

Stovaine-Saline Solutions.

Spinal anæsthesia with Stovaine 0·1 Gm., Sodium Chloride 0·1 Gm., Distilled Water 1 Cc. Results good, but a number of patients would prefer to sleep.—R. B. Coleman, B.M.J. i./25,548.

The injection should not be made if blood pressure is below 100 mm. Amnesia is induced by Omnopon (2/3 grain) and Scopolamine (1/300 grain) 1½ hour before operation, followed by Scopolamine (1/450 grain) after half and after one hour. The dose of Stovaine is regulated by the condition of the patient and intraspinal pressure (measured by a special manometer). A 10% Stovaine-Saline solution is preferred to Stovaine-Glucose, as it diffuses more rapidly and, with debilitated subjects, or when the spinal pressure is low, a dose not exceeding 0·5 Cc. is advised. In a few cases causing anxiety the patient's condition was improved by measures taken to ***raise the blood pressure,*** viz., compression of the abdomen, raising extremities, or adoption of the Trendelenburg position, or by Pituitary as a cardiac stimulant.—D. N. Kalyanvala, Edin. Med. Jl.

Caffeine 2 grains hypodermically as soon as Stovaine has been administered, to counteract the fall in blood pressure, and keep a second dose ready in case of emergency (the two "danger periods" are immediately after injection and 20 minutes later): Pituitary Extract a satisfactory substitute. Let the maximal dose of Stovaine solution be 0·8 Cc.—Hamilton Bailey, Pr. June, '27,372.

To prevent shock following intraspinal anæsthesia: after removal of 5 to 10 Cc. spinal fluid and the injection of anæsthetic, the spinal fluid is injected intravenously at the bend of the elbow and the operation commenced 5 or 6 minutes later.—B.M.J.E. i./27,21.

UROLOGICAL SURGERY.—Spinal anæsthesia ideal. Contraindicated in hypotension with blood pressure below 100 mm., also in extreme toxicosis, the moribund state and the presence of spinal or brain tumours.—B.M.J.E. i./27,65.

Barker's Solution used many hundreds of times with patient in Trendelenburg position, 10% Novocain also used.—F. Shipway, L. i./30,210.

Much of the hostile criticism of Stovaine due to faulty technique.—I. W. Magill, L. i./31,353.

Combined spinal and splanchnic anæsthesia. For abdominal operation in the neighbourhood of the diaphragm, spinal anæsthesia with 0·1 Gm. Stovaine (between the 2nd and 3rd lumbar vertebræ), ***combined with splanchnic anæsthesia with 60 to 70 Cc. 0·5% solution of Novocain,*** given according to Braun's method, is the anæsthetic of choice. In operations lasting over an hour spinal anæsthesia alone is not sufficient. Anæsthesia may be further prolonged by a further dose of splanchnic anæsthetic and infiltrating the peritoneal and abdominal muscles with 0·5% Novocain in 1 in 200,000 Adrenalin solution. In nervous patients, a dose of ***Avertin per rectum*** produces quiet sleep. The combination gives complete and uniform muscular relaxation and reduces diaphragmatic movements to a minimum. The method gave a 50% fall in mortality from abdominal operations.—B. Hughes, B.M.J. i./29,898.

Solutio Stovainæ, St. Th. H. is 2½ or 5%.

Solutio Stovainæ et Glucosi, St. Th. H., contains 2½ or 5% with Glucose in addition in each instance.

(B.) **Stovaine-Dextrin Solution** (TYRRELL GRAY).

This contains Stovaine 3%, with Dextrin, Suprarenin, etc.

Dextrin is a suitable addition, it being readily soluble, and innocuous. It appears to help in controlling vomiting delay and absorption.

Tyrrell Gray strongly advocated the method for even very young children. B.M.J. ii./13,392; L. ii./13,554; *see also* B.M.J. ii./11,497.

1·2 Cc. of CHAPUT'S FORMULA, *i.e.*, 0·12 Gm. of Stovaine, used in error. Twice without ultimate serious result.—W. Sourasky, B.M.J. ii./26,524.

(C.) Ⓟ**Stovaine Strychnine Injection** (JONNESCO).

Dose.—From 0·01 Gm. Stovaine with Strychnine Sulphate $\frac{1}{3}$ mgr. for ages 1 to 5 years; up to 0·1 Gm. Stovaine with 1 mgr. Strychnine, dissolved in 1 Cc. Sterile Water for adults.

The higher doses to be used with caution.

The employment of Strychnine in conjunction was thought to render operations above the waist line safe, but the method does not show a high percentage of safety. Stovaine anæsthesia is not entirely devoid of danger.—*See also* A. A. Morrison, B.M.J. ii./21,745.

(D.) **Stovaine Caffeine Injection** (JONNESCO).

Dose.—From 0·02 to 0·05 or 0·1 Gm. Stovaine with Caffeine 0·5 Gm. now preferred to the Strychnine method (*antea*). 5,000 cases.—T. Jonnesco, Pres. Med., Oct. 28, 1922, p. 929.

Favourable results in spinal anæsthesia with Stovaine and Caffeine.—B. Desplas, L. ii./23,1235.

Potassium Sulphate 0·25 to 0·5% added to local Anæsthetics, useful—increases the effect. *cf. Note* to Potassium Sulphate.

Tyrrell Gray found spinal anæsthesia of value in diminishing shock, valuable in *renal disease*, disease of the *lungs*, and when *muscular relaxation* is desirable.—B.M.J. ii./10,766.

Intraspinal injection of Stovaine does not inhibit uterine contractions but interferes with full relaxation between the pains.—A. W. Bourne and J. H. Burn, B.M.J. ii./30,87.

To examine urine and liquor cerebralis for Stovaine see Vol. II.

℞ Ⓟ1 **Stovaine Solution.** *For Internal Use. Dose.*—For persistent vomiting 5 to 10 minims every 2 hours without either food or drink. Later 3 to 5 minims before a meal :—

Stovaine 15 grains, Atropine Sulphate $\frac{1}{2}$ grain, Morphine Hydrochloride 3 grains, Chloroform Water 1 ounce.

Compresses 5 to 10%. **Gargle** 0·5% (flavoured).

Glyco-Gelatin Pastils $\frac{1}{20}$ grain (**0·003 Gm.**). **Stovaine Snuff** for coryza 1 to 5% with Bismuth Carbonate and Milk Sugar is used.

Stovaine Ointment for painful wounds and hæmorrhoids :—

Stovaine 0·7, Adrenalin Solution 20, Paraffin Ointment 100.

***Phenolaine** (T.M. B. 452941).

Dose.—For general surgery, *e.g.*, for hernia or appendicitis, use 2 drops of Phenolaine to each ounce of sterile water. Not more than 6 ounces of the dilution should be used at one time. For teeth extraction use 8 drops to one ounce of water.

The preparation is stated to contain Methyl, Ethyl, Benzoic and Carboxyl groups and an Amine group. It has been used in a large number of operations without trouble as regards bleeding or subsequent after-effects. It does not produce vasodilation on subcutaneous or intramuscular injection. Amputations of the breast have been conducted with 12 drops in 6 ounces of water.

Corneal opacities treated by subconjunctival injections of Phenolaine—see 'Ophthalmic Surgery' by V. Nesfield, reviewed.—L. ii./22,1128.

Gives prolonged anæsthesia in direct contact with nerve fibres.—A. J. Copeland, B.M.J. ii./24,41.

Nebulæ and leucoma of the cornea treated by subconjunctival injections of phenolaine 2 m. to ounce of tap water.—A. Ferguson, B.M.J. i./26,865.

***Psicaine** (T.M. 449793), the acid tartrate of *d*-ψ cocaine, a synthetic Cocaine-isomer. A white powder, soluble in 4 of water, yielding a faintly acid solution. Said to be an improvement on cocaine.—C.D., July, '24,63.

Both Psicaine and Cocaine give rise to symptoms identical in characte though not in degree; Psicaine is the more powerful stimulant. Irritan effect less than Cocaine and insignificant for practical purposes. It ha relatively little effect on blood vessels. It was found to be more toxic an less efficient than Cocaine.—A. J. Copeland, B.M.J. i./25,10.

✱**Tutocaine** (T.M. 437698). *Syn.* α-DIMETHYLAMINO-β-METHYL-γ-2 AMINOBENZOYL OXYBUTANE HYDROCHLORIDE.

Used as local anæsthetic in 0·2 to 1% solution.

Tutocaine is about three times less toxic than Cocaine, and rather more tha twice as toxic as Novocain. From clinical observations a 5% Tutocain solution has the same anæsthetic effect as a 3½% Cocaine solution.—E. Watson Williams, L. i./25,913.

For both infiltration and surface anæsthesia the minimal effective concen tration of Tutocaine is ¼ that of Cocaine or Psicain (about 0·013% for Cocaine The minimum lethal doses for guinea-pigs were Cocaine 0·05, Psicain 0· and Tutocaine 0·2 Gm. per kilo. The efficiencies, calculated as the rati of lethal dose to minimum effective dose, were 4, 6·3 and 64·5 respectively The anæsthesia is lengthened by the addition of Adrenalin to the solution The addition of Phenol in small amounts increases potency in surface anæs thesia.—W. Wagner, Arch. Exp. Path., Pharm., 1925,109,64-73; J.C.S A. i./25,1503.

The most suitable strength for urethral work is ¼ to ½% with Adrenalin— M.m.W., Oct.'26,1659, per Pres., Jan.'27,7.

Tutocaine more toxic than Novocain, but quicker in action. 1 in 500 solutio proved a reliable anæsthetic.—H. V. Molesworth, B.M.J. i./30,13.

Butyn. Stated to be *p*-AMINO-BENZOYL-γ-DI-*n*-BUTYL-AMIN PROPANOL SULPHATE.

Dose.—By *hypodermic injection* 1 Cc. and upwards of ½ or mor per cent. solution according to circumstances.

Chemically it is allied to Cocaine and Novocain. A white amor phous powder, freely soluble in water.

A local anæsthetic quicker and more profound in action tha Cocaine. When used in eye work, accommodation is not paralysed

For removing foreign bodies from the eye a drop of 1% solution almost immediately produces anæsthesia.

Butyn Sterules 1 and 2% 1 Cc. and TABLETS 1/6 grain (0·01 Gm.) are made One of the latter in 1 Cc. of distilled water (*not* Normal Saline with which Butyn is *incompatible*) makes a 1% Solution.

Isotonic Solutions may be made with addition of Potassium Sulphate.

A ½% solution requires 1·34 Gm. in 100 Cc.	2% solution requires 0·97 Gm in 100 Cc.
,, 1% ,, ,, 1·21 ,, ,,	5% ,, ,, 0·24 Gm in 100 Cc.

The absence of dilatation of the pupil justifies its use in glaucoma as an analgesic in combination with Eserine or Pilocarpine. Operations on the muscles by infiltration with 0·5% solution.—W. M. Beaumont, L. ii./22,304.

In operative eye work 1 to 2% Butyn solution used. For profound anæsthesia 4% or 5%. Four applications at intervals of 2 minutes. 2% applied topically, also suited for nose, ear and throat, *e.g.*, septum resection tonsillectomy and adenoids. In dental work 10 drops or more of ½% solution on opposite sides of the tooth to be extracted, with or without Adrenalin; allow one minute to elapse. For genito-urinary work 2% used.—W. M. Beaumont, B.M.J. i./23,57.

Butyn is quite as toxic as Cocaine and less efficient.—L. ii./23,1297. *Cf.* our p. 342. Possibly 'habit forming.'—A. J. Copeland, B.M.J. ii./24,41.

Contraindicated where there is a solution of continuity in the mucous membrane, either through trauma or ulceration, as this allows too rapid absorption of the drug.—W. R. Jamieson, Jl.A.M.A. i./29,1519.

Pharmacology of Local Anæsthetics (Cocaine and Substitutes), see Vol. II.

℞ **CODEINA** (*B.P.* '14). U.S., Ph. Ned. V., P. Ital. V., Fr. Cx., F.E. VIII., P. Belg. IV. $C_{17}H_{18}(CH_3)NO_3,H_2O=317{\cdot}1874$.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**). (*B.P.* '14, $\frac{1}{4}$ to 1 grain), Fr. Cx. has *maximum single dose* $\frac{3}{4}$ grain, maximum during 24 hours 3 grains approximately. P. Ital. and P. Belg. similar. U.S. average $\frac{1}{2}$ grain.

Codeine is not really dangerous as an addiction drug. It is wisely excluded from D.D.A.—Sir W. Willcox, P.J. i./24,28.

Codeine and Dangerous Drugs Bill, 1922.—It was argued at the 1925 Geneva Convention that Codeine could be converted into drugs of addiction. Codeine being usually manufactured from Morphine, it is open to a manufacturer, if Codeine remains exempt from control, as at present, to buy Codeine in the open market without the knowledge of the Government; he can then divert a corresponding amount of Morphine into the illicit traffic and explain its disappearance by saying that he has converted it into the Codeine. It was finally agreed that it should only relate to manufacture, export and wholesale trade.—B.M.J. Sup. March 5,'32.

An alkaloid from opium or from morphine, in nearly colourless trimetric crystals. *Soluble* 1 in 130 of water, very soluble in diluted acids, in alcohol 90% 1 in 2, in chloroform and in excess of aqueous ammonia, but insoluble in excess of potash solution. It is a methylic ether of morphine—monomethyl-morphine.

Flavoring.—It has a slightly bitter taste, *vide* Morphine.

Uses.—In moderate doses is hypnotic and in frequent small doses it allays cough in phthisis. In diabetes beginning with a $\frac{1}{4}$ grain thrice daily it lessens the amount of sugar in the urine. A useful sedative in chronic cystitis with enlarged prostate.

For cough following catarrh $\frac{1}{2}$ to 1 grain gives relief.—Tilley.

In tuberculosis relieves the night cough.

Diabetes insipidus under treatment with Codeine.—L. i./14,16.

℗ **Codeine and Glycerin Jelly.** *Dose.*—1 drachm = $\frac{1}{8}$ grain Codeine.

An agreeably flavoured preparation containing in addition to Codeine, Glycerin, Oil of Lemon, Balsam of Tolu.

Useful in chronic laryngitis, phthisical cough, etc. Also in ulcer of the stomach.

℗ **Pastillus Codeinæ.** $\frac{1}{8}$ grain in each.

℞ **Pilula Codeinæ Composita.**

Codeine $\frac{1}{4}$ grain (increased to 2 grains if necessary), Extract of Nux Vomica $\frac{1}{2}$ grain, Extract of Lettuce $\frac{1}{4}$ grain or more. To make one pill, to be taken two or three times a day, for diabetes.

Note.—Use Mucilage, not syrup, as excipient.

℗ **Capsulæ Codeinæ et Valerianæ Compositæ.**

Dose.—One or more *p.d.* according to strength. Codeine $\frac{1}{3}$ to 1 grain, Valerian Extract 2 grains, Phenol 2 grains, Cascara Extract $1\frac{1}{2}$ grains.

In glycosuria, Codeine is the most valuable drug for treatment.

The Valerian is a nerve sedative; the phenol intestinal disinfectant.

The combination has been found helpful.—G. Rankin.

℗ **Trochisci Codeinæ** contain $\frac{1}{8}$ grain (**0·008 Gm.**)

℗ **Capsulæ Codeinæ cum Extracto Cannabis Indicæ.**

Codeine $\frac{1}{2}$ grain, Extract of Indian Hemp $\frac{1}{4}$ grain.

In neuralgia one every 4 or 5 hours.

℗ **Codeinæ Hydrobromidum.** $C_{18}H_{21}NO_3HBr+2H_2O=416{\cdot}1268$.
An anti-spasmodic similar in dose and use to the phosphate. For eye work has been advised to take the place of Ethyl-Morphine—being said to cause less pain.

℗ **Codeinæ Hydrochloridum.** Ph. Ned. V., P. Ital. V.
$C_{18}H_{21}NO_3.HCl,2H_2O=371{\cdot}6678$.
Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**). White crystalline powder soluble 1 in 25.

℗ **Codeinæ Periodidum.** $C_{17}H_{18}(CH_3)NO_3.2I=553{\cdot}0358$.
Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**).
When made by the interaction of Codeine base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides), this compound is obtained as a yellowish-brown powder containing 54·1% Codeine.
The Periodide was made in the writer's laboratories (1923). A considerable proportion (38·5% of the Periodide) of the contained alkaloid is liberated to Physiological Acid and a further marked proportion (11·6% of the Periodide) is yielded to Physiological Alkali when treated with it subsequently.
Solubility.—Slightly soluble in Chloroform, soluble in Alcohol insoluble in Ether and water.
Incompatible with alkalis, and with salts of metals, and otherwise as alkaloids.
Pharmacology.
Doses of $\frac{1}{4}$ and $\frac{1}{2}$ grain were taken by two of the author's assistants (J.T.E. and C.C.B.). J.T.E. at the time was suffering from slight insomnia and a persistent cough. The effects of the $\frac{1}{2}$ grain dose in relieving both the insomnia and the cough were so gratifying that he continued for a week on the treatment, taking $\frac{1}{2}$ grain in capsule form each night.
Uses.—Suggested in moderate doses as hypnotic, in common with other Codeine compounds, also to allay irritating cough, especially of phthisis.
The antiseptic action of the Iodine it contains (45·9%) makes the compound a useful addition to therapy.
Dispensing Note.—To be given alone, finely powdered, in cachet or 'slipule' (No. 5) as required, preferably after a meal.

℗ **Codeinæ Phosphas** (*B.P.* '14). U.S. X., P. Jap., Fr. Cx., P.G. VI., P. Ital. V., P. Belg. IV. $C_{18}H_{21}NO_3.H_3PO_4,2H_2O=433{\cdot}2064$.
Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**). Fr. Cx. has max. during 24 hours 5 grains approximately. Slipule No. 5 for $\frac{1}{2}$ grain.
In granular snow-white crystals, soluble 1 in 4 of water. Contains 69·05% of anhydrous alkaloid, and is most suitable for hypodermic injection, 1 grain in 15 minims (**1 Cc.**).

℗ **Syrupus Codeinæ Phosphatis** (*B.P.* '14).
Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).
Codeine Phosphate 0·5% in a solvent of Distilled Water and Syrup.
Sirupus Codeinæ. *Syn.* Jarabe de Codeina, F.E. VIII.
Dose.—5 Gm. (1 drachm approx.) with a total of 25 Gm. in 24 hours.
Codeine 2 Gm., Distilled Water 20 Gm., Acetic Acid sufficient quantity, Simple Syrup 980 Gm.

℗ **Tablets, Compressed, of Codeine Phosphate** $\frac{1}{4}$ and $\frac{1}{2}$ grain.

Ⓟ **Linctus Codeinæ, G.H.** *Dose.*—1 to 2 drachms.
Syrup of Codeine 1, Syrup of Virginian Prune, 1.
St. Th. H. has same strength of Codeine, but different vehicle.

Ⓟ **Syrupus Picis cum Codeina,** *v.* Pix Liquida.

℗1 **Codeinæ Sulphas,** U.S. $(C_{18}H_{21}NO_3)_2H_2SO_4,5H_2O = 786{\cdot}4252$.
Average dose.—$\frac{1}{2}$ grain (**0·03 Gm.**).
Given with advantage in sciatica, also in *Morphine habit, q.v.*

℗1 **Codeine-Methyl-Bromide.** *Syn.* EUCODEINE.
$C_{17}H_{18}CH_3NO_3.CH_3Br = 394{\cdot}2102$.
Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**). Is less toxic than Codeine.

Ⓟ ✱ **Botoi Tablets** (T.M. 512087).
Dose.—1 to 5 tablets per day according to age and nature of cough.
Described as a laryngeal narcotic and stated to contain Codeine 1/6 grain, Bromoform 4 minims, Aconite Tincture 5 minims, and Tinct. Bellad. 5 minims

Ⓟ ✱ **Veganin** (T.M. 469189) **Tablets.** *Dose.*—1 or 2.
Codeine, Phenacetin, and Aspirin. Antipyretic and analgesic.

℗1 **Apocodeinæ Hydrochloridum,** $C_{18}H_{19}NO_2.HCl = 317{\cdot}621$.
Dose.—$\frac{1}{10}$, gradually increased to 1 grain (**0·006 to 0·06 Gm.**). A greyish powder soluble in water.
A good expectorant hypodermically. Solution must be neutral; dose up to 25 minims of 2% solution. Internally, 10 to 30 minims of 1% solution caused no nausea or vomiting, but produced free expectoration. In pill 3 or 4 grains daily may be safely given.
Uses.—Is a sialogogue and sedative and increases peristalsis.
As ***Hypodermic Purgative,*** 30 minims of 1% solution = $\frac{1}{3}$ grain (**0·02 Gm.**), may purge in half an hour or less, but may also prove emetic.

Ⓓ ℗1 **Eucodal.** *Syn.* ✱ EUKODAL (T.M. 402643).
DI-HYDRO-OXY-CODEINONE HYDROCHLORIDE, $C_{18}H_{21}NO_4,HCl = 351{\cdot}6366$.
The Scheduling of Eukodal as a Dangerous Drug is fully justified. Its use in Germany as a narcotic has been extensive.—P.J. ii./28,218.
White crystalline powder soluble in water. M. Pt. 270° C.
Uses.—Analgesic and hypnotic. Used in pleurisy, bronchitis, tuberculosis, and for pain generally.

Ⓓ ℗1 ✱ **Dicodid** (T.M. 475651). *Syn.* DIHYDROCODEINONE ACID TARTRATE.
Dose.—Tablets contain 1/12 to 1/16 grain (**0·005 to 0·01 Gm.**) for internal use. Half a tablet to commence with, not on an empty stomach.
White crystals soluble in water.
Dicodide, Eucodal, and Dilaudid.—M. Pts., etc.—P.J. ii./31,246.

Ⓓ ℗1 **Acetyldihydrocodeinone.** *Syn.* ACEDICONE added to Part III. D.D.A. 1920. May not be imported without Licence—Home Office, June, 1932.

COLCHICUM.

Syn. MEADOW SAFFRON. COLCHICUM AUTUMNALE. (*Liliaceæ*).

Both **Corm** and **Seeds** are *B.P.* '14 and U.S. F.I. requires the seed for the preparations of Colchicum. The Corm is in U.S. with not less than 0·35% Colchicine. *Average dose.*—4 grains.

The seed U.S. contains not less than 0·45% Colchicine. *Dose.*—3 grains. P. Ital. V. and P. Belg. IV. specify seeds, both with 0·4% Colchicine; F.E. VIII., 0·45%.

℗**Tinctura Colchici (Seminum)** (*B.P.* '14). Strength 1 in 10 Alcohol 70%, as required by F.I.=Fr. Cx., F.E. VIII. and Ph. Ned. V. B.P.' 98 was 1 in 5 of alcohol 45%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Fr. Cx.—Max. Single Dose.—25 minims, and max. during 24 hours 100 minims approx.—and P. Belg. have this strength.

℗**Vinum Colchici** (*B.P.* '14). 1 of Corm in 5 of Sherry.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Is given in mixtures with alkali and Magnesium Sulphate.

In gout, controls the inflammation. 30 minims as first dose, then 15 minims, every three hours. It is not objectionable to the taste.

℗ **Liquor Antirheumaticus Compositus.**

Dose.—30 minims (**2 Cc.**).

Colchicum Wine 15, Spirit of Æther 5, Camphor 2, Compound Tincture of Lavender to 30. A preparation used on these lines in Denmark contains Ammoniacum in addition.

℗**Extractum Colchici** (*B.P.* '14). The inspissated juice of fresh Corms—as *B.P.* '98. *Dose.*—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

U.S. X. is an alcoholic extractive washed with Benzine, evaporated, assayed and adjusted with Starch to contain 1·4% Colchicine. Fr. Cx. extracts seeds with 70% alcohol, not standardised. Max. single dose $\frac{3}{4}$ grain, max. in 24 hours 3 grains approx. P. Ital. V. extracts with Alcohol 60% 2% Colchicine, P. Belg. and F.E. VIII. use 70%; 2% Colchicine.

Uses.—Removes the gouty swelling and congested state of joints by increasing the circulation, and so eliminating the obnoxious metabolic products of the disease. It may be given in pill with Ipecacuanha and Mercury.

To abolish the vomiting and diarrhœa often primarily produced (by increase of peristalsis) a small dose of Atropine may be given with it.

℗ **Fluidextractum Colchici (Seminis), U.S. X.**

Dose.—3 minims. Standardised to 0·4% (average) Colchicine.

ℙ1 **Colchicina.** Fr. Cx. F. E. VIII.

$C_{15}H_9(O.CH_3)_3\begin{Bmatrix} NH.CO.CH_3 \\ CO.OCH_3 \end{Bmatrix}$ = 399·203.

P.G. VI. has $C_{22}H_{25}O_6N + \frac{1}{2}CHCl_3$. (Contains 87% Colchicine.)

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**) in a pill.

Fr. Cx. has *maximum single dose* $\frac{1}{32}$ grain; max. during 24 hours $\frac{1}{16}$ grain approximately.

Intravenously has been tried in dose of 1/100 grain with Sodium Iodide and Sodium Salicylate 1 Gm. each in 20 Cc.

This active principle is a yellowish crystalline powder, ***soluble*** in water 1 in 22 with neutral solution, readily in Alcohol 90% but less in Absolute Alcohol, very soluble in Chloroform, slightly soluble in Ether (1 in 155). It is a weak base, most of its salts being decomposed by water. Of use in acute gout, rheumatic gout, asthma, cerebral congestion, and uræmia.

Phosphotungstic Acid is useful for isolating.—Davies and Grier, P.J. ii./22, 210.

Colchicine varies internationally 20%. The body with 6 to 7% water (1·5 mol.H_2O) should be advised.—P.J. ii./30,242.

℞ **Pilula Colchicinæ, Hyoscyami et Nucis Vomicæ.**

Dose.—One every three or four hours.

Colchicine $\frac{1}{70}$ grain, Hyoscyamus Extract $\frac{1}{2}$ grain, Nux Vomica Extract $\frac{1}{4}$ grain, Sugar of Milk $\frac{1}{2}$ grain. Rapidly relieves gout.—A. P. Luff.

Toxic Action. Colchicum affects the gastro-intestinal membrane. It may cause pains in the bowels, vomiting, diarrhœa, intense thirst, and violent burning in the throat, œsophagus and stomach.

Colchicine 34 mgr. taken over a period of 19 days with 6 to 8 drachms of Laville's Liqueur caused paralysis. The palsy persisted for nearly a month. Even after 6 months not entirely cured.—B.M.J.E. i./15,19.

Antidotes.—Evacuate the stomach. Give water and demulcents—white of egg, oil, barley water. Apply heat to feet. Stimulants.

℞ **Colchicine Salicylate**.—*Syn.* **Colchi-sal.**

$C_{22}H_{25}NO_6.C_6H_4OH.COOH = 537{\cdot}2498$.

Dose.—$\frac{1}{60}$ grain (**0·001 Gm.**).

A yellowish powder, ***soluble*** in water.

℗ **Capsules** contain $\frac{1}{250}$ grain in Methyl Salicylate. Used in rheumatism and gout. *Dose.*—One every two hours.

Gloriosa Superba (*q.v.*) contains Colchicine.

COLLODIUM.

Collodium Flexile (*B.P.* '14).

Contractile Collodion with addition of a small proportion of Canada Turpentine and Castor Oil, makes a more elastic film than Contractile Collodion U.S., which contains 2% Camphor and Castor Oil 3% in Collodion U.S.

P. Off.—It is proposed to have one collodion only, containing Pyroxylin 2, Colophony 3, Castor Oil 2, Alcohol (90%) 24, and Ether to 100. According to our view it is too thin.

Pyroxylin dissolved in acetic ether adheres closely and is pliable. See our experiments under Collodion.

Collodium Elasticum, P. Austr., Ph. Ned. V. Collodion 98, Castor Oil 2. Fr. Cx. has Collodion (Fr. Cx. *q.v.*) 95, Castor Oil 5.

Collodion (*B.P.* '14) —*Syn.* Contractile Collodion.

Was a solution of Pyroxylin in an ether-alcohol mixture. Keep from naked light. Pure ether answers better. In preparing, add the pyroxylin to the alcohol and afterwards the ether.

Collodion (*B.P.*'14) is far too thin : increase the Pyroxylin by 50 to 100%, the latter in preference.—J. H. Franklin, P.J. i./27,52. We agree.

Acetone is also a good inexpensive solvent, but the film is opaque.

U.S. X. has Pyroxylin 4, Ether 75, Alcohol 25.

Fr. Cx.—Pyroxylin 5, 95% Alcohol 20, Ether 75.

P.G. VI. gives directions for proceeding direct from Cotton Wool,

Pyroxylin (dinitrocellulose $C_6H_8(NO_2)_2O_5 = 252{\cdot}0784$). *Syn.* **Colloxilina,** F.E. VIII., is prepared by the action of nitric and sulphuric acids on cotton. It is freely soluble in Methyl Alcohol, Acetone, Amyl Acetate, Glacial Acetic Acid and Ether mixed with an equal volume of either Ethyl or Methyl Alcohol. In making **gun-cotton** (trinitro-cellulose) $C_6H_7(NO_2)_3O_5 = 297{\cdot}0786$ the mixture of acids contains a larger proportion of nitric acid and the time of action is longer. This body is insoluble in a mixture of Alcohol and Ether.

Pyroxylinum, U.S. X. gives double the molecular formula—
$C_{12}H_{16}(ONO_2)_4O_6 = 504{\cdot}1568$.

Experiments which we conducted to improve '**Collodion**' gave the following:—

Collodium Aceto-Æthericum.—Pyroxylin 5, Acetic Ether *q.s.* to 100. The odour is a slight objection, otherwise the best substitute so far found. Does not pucker the skin anything like so much as the B.P. preparation. Is simple in making.—Consistence excellent.

Is not more irritating in use than Collodion (*B.P.*'14). Adheres closely and is transparent.

Collodium Acetonum B.P.C.—Pyroxylin 5, Clove Oil 2, Amyl Acetate 25, Benzol 20, Acetone to 100. U.C.H. adopts this. Another formula: Pyroxylin 5, Camphor 1, dissolve in Acetone 90, and make up to 100. Evaporates more slowly than ordinary collodion, but makes stronger film.

℞ **Anodyne Colloid.**—*Syn.* Amyl Colloid.

Amyl Hydride ½ ounce, Absolute Alcohol ½ ounce, Aconitine 1 grain, Veratrine 6 grains, Collodion to 2 ounces.

For neuralgia, sciatica, lumbago, all muscular pains, etc. The amyl by its rapid volatilization gives prompt relief. Should pain continue the alkaloids are effective by applying a piece of moist spongio-piline over the collodion film.

'**New Skin**' is a Collodion preparation.

Collodium cum Oleo Crotonis.

Croton oil 1 part mixed with 7 parts, more or less as required, of Flexible Collodion, forms a useful counter-irritant; a thin layer painted on quickly dries and its action is limited to the spot to which it is applied.

Collodium Benzoini.—*Syn.* Kelly's Paint.

Add Compound Tincture of Benzoin 3 to Collodion 1, shake until mixed and add Glycerin 1. Keep well corked and shake before use.

As an antiseptic covering to slight wounds. It dries slower than ordinary collodion, but gives a harder film. Used in New York.

Collodium Iodi. Iodine 1 (more or less if required) to 15 Collodion, sustains the action of the iodine and the film protects the part. Recommended for ringworm, alopecia, chilblains and frostbite.

Collodium Salicylicum.

Salicylic Acid 1, Collodion (¾ strength) 5. For use on exposed parts like the next preparation.

In skin diseases, Salicylic Acid 1 drachm in 8 said to have amazing results in chilblains, and to be useful in many dry dermatoses. Remarkable results in acute dermatitis, eczema, etc., with ointment of equal parts of Salicylic Acid and Vaseline.—Sir G. A. Reid, Clin. Jl., Dec. 26/23,617.

℗ **Collodium Callosum.**

Salicylic Acid 8, Extract of Indian Hemp 1, Collodion (¾ strength) 60. A rapid and painless solvent for corns and warts.

℗ **Collodium Acidi Salicylici,** L. H. is similar, namely Salicylic Acid 1 drachm, Extract of Indian Hemp 20 grains, Collodion 1 ounce.

℗ St. Bart's H. adds Zinc Chloride 20 grains to the ounce.

℗ **Collodium Salicylicum cum Zinci Chlorido.**

Salicylic Acid 2, Zinc Chloride 1, Collodion 15. Forms a clear solution. This and the above have proved useful in epithelioma.

℗ **Mercuric Chloride** to the extent of 1 in 30 or more of Salicylic Collodion may be used to warts.

Collodium Salicylicum et Lacticum.

Salicylic and Lactic Acids, of each 10, Collodion 80. Lactic Acid, being destructive to morbid growths, is said to increase its efficacy.

Collodium Stypticum.—*Syn.* **Styptic Colloid.**

Absolute Alcohol 16, Benzoin 1½. Dissolve, filter, and add Tannic Acid 16, Gun Cotton 1½, Purified Ether to 100. Mix, set aside three days, and decant. Useful in checking various forms of hæmorrhage when it can be brought in contact with the bleeding surface.

Camphoid, a substitute for Collodion.

A solution of pyroxylin and camphor in absolute alcohol. May be used as a vehicle for the application to the skin of such drugs as iodoform, phenol, salicylic acid, resorcin, iodine, chrysarobin, and ichthyol. Iodoform dissolves in it to the extent of 1 in 10. The preparation dries in a few minutes, leaving a film, which is not easily washed off.

Celluloid. Made by dissolving Pyroxylin 50 in a solution of Camphor 25 in ether 100 and manipulating the mass until it has become plastic. It is then dried. Colours may be incorporated.

It is supplied in thin sheets and being light, rigid and washable, is useful in surgery for splinting ; it is rendered plastic by rolling up and macerating in hot spirit for a few minutes ; it may then be wrapped round the limb with a layer of wool outside and quickly sets. N.B.—Very inflammable. Celluloid was originally called **Xylonite.**

Soluble according to our work more readily in Acetone than in Amyl Acetate, but the film resulting in the first case is liable to be opaque. Mixtures of these solvents are frequently used. A collodion can be readily made strength 1 in 20 using equal parts of the solvents. (The celluloid should be shredded).

Celluloid Splints employing **Pexuloid,** a special solution. As used at the Hospital for Sick Children, Great Ormond Street, London.—Details Edn. XIX., p. 361.

'Non-inflammable' Celluloid is Cellulose Acetate. It is not actually unburnable, but is as safe as paper. It burns slowly without the evolution of dangerous gases.—L. i./29,1283.

Danger of inflammable films used in hospitals and by radiologists for cheapness.—L. ii./31,1310.

COLLOIDAL METALS.

Certain Metals and Metalloids in the form of Colloidal Solutions are considerably used in therapeutics.

General Characters.

The term **Colloidal** (from Κολλα=glue) was used by Thomas Graham, to distinguish between amorphous substances in solution, which diffuse with difficulty, and **Crystalloid** substances, which crystallise easily from Solutions and diffuse quickly from their solutions into a water stratum, or which pass with ease through membranes, *e.g.*, those employed in the process known as dialysis. Glue and Gelatin are typical Colloidal substances,—they do not exhibit the property of diffusion in this manner.

The view held now is that colloids and crystalloids are not different kinds but rather different states of matter, the same chemical substance being obtainable in one state or the other according to how it is

made. Many substances which might be regarded as typical crystalloids have been produced in the colloidal condition. For theoretical study see ' Chemistry of Colloids and some Technical Applications,' by W. W. Taylor (E. Arnold). *Further details* E.P. XIX, p. 362.

The real characteristic of the colloidal state is that the particles are large enough to possess the properties of surface.

The *Osmotic pressure* of most colloidal solutions is very small, exceptions being those colloids which are salts of an inorganic base or acid such as Na or Cl respectively, combined with a large organic ion as the anion or cation. Examples: Soaps and dyes.

The particles range in size from 0·1 $\mu\mu$ to 20 $\mu\mu$. Those of diameter less than 3 to 5 μ show '*Brownian*' *Movement.*

' Brownian ' movement is due to the perpetual movement of the molecules of the liquid, and to their possession of mass and, therefore, kinetic energy. The colloidal particles are continually being hit by these molecules and their movement is thus maintained.

A Colloidal Solution is usually dichroic, *i.e.*, transparent by transmitted and relatively opaque by reflected light.

Electrical Properties.—The disperse particles are charged with + or — electricity. In water, amongst the + charged are the Metallic Hydroxides, Silicic Acid and Basic Dyes, *e.g.*, Methyl Violet, Methylene Blue and Magdala Red in Water. Amongst the — charged are all the Metals, Metallic Sulphides, and certain Dyes such as Indigo, Eosin, Fuchsin, also Mastich, Gamboge and Starch. On passing an electric current into a colloidal solution the + charged particles move towards the cathode and the — towards the anode.

Protection.—All metallic colloidal solutions require *protection* by organic colloid, *e.g.*, Gelatin, Albumin, etc. *Unprotected electrically prepared colloids are unstable.*

The presence of protectives, unless controlled, and data as to its type, renders reports of effect of no value, as *e.g.*, when Peptone or Silicic Acid is used. Their action in preventing the precipitation of suspensoid colloids is probably due to the deposition of a layer of emulsoid on the surface of the particles.

The addition of Sodium Chloride, to render a solution for medicinal use isotonic with blood, according to Bayliss, *is unnecessary*, as the amount injected is small, and should be given slowly.

The protective effect of different substances is called the ' gold value,' *i.e.*, the number of milligrammes of a colloid which are just capable of protecting 10 Cc. of a Gold Solution containing 0·0053 to 0·0058% of Gold from coagulation by 1 Cc. of a Sodium Chloride Solution containing 100 Gm. of Salt in 900 Cc. of Water. The value for Gelatin and Glue 0·005 to 0·01.

For particulars of adsorption see Vol. II.

A colloid solution should be dichroic, generally fluorescent, show Brownian movement, be indiffusible, stable at increased temperature and be affected by adding certain electrolytes. If stable, protective Colloid is probably present.

In ultramicroscopic examination (*a*) care must be taken to examine the solution in a state of dilution comparable with that of a solution known to

have all the particular compound present in the colloidal state. Certain commercial preparations, though showing particles with the ultramicroscope, have been found to contain nearly all the matter present in true solution, and diffusible through parchment.

(*b*) Extent of true solubility of the substance in the liquid must be taken into account. Thus, Iodine is soluble in water 1 in 5,000, and in a colloidal preparation it would therefore be suspended in a saturated solution. The so-called 'solutions' of Iodine in Oil would, of course, contain a larger amount in true solution. In fact, in many commercial preparations it has been found that the activity is equivalent to the fraction present in true solution.—Bayliss.

Tests of Colloidal Sols.—Examination of Colloidal Sols with the ultra-microscope or with 1/12th inch oil immersion and an 8 c. Leitz eye piece, using a specially good dark ground illumination, showed marked difference in amount of movement of various preparations.

Colloidal Sols must also show the "**Tyndall Effect**"—*i.e.*, when placed in a test cell made of optical glass and subjected to action of a powerful beam of parallel light they show the characteristic turbidity.—A. B. Searle, Pres., June, 1920, p. 235.

Chemical Methods of Manufacture previously published.

In the 19th Edn., Vol. I., p. 365, we provide details relative to **Aluminium Hydroxide, Arsenic, Bismuth, Gold, Manganese, Selenium,** etc., to which reference may be made.

Electrical Methods of Manufacture.

The disruption by an electric arc of metals into fine powder and the formation of dark liquids by employing terminals of the metal required was investigated by G. Bredig (1898). A direct current arc is used. The strength of current is 5 to 10 ampères. E.M.F. between 30 and 110 volts. Gold, Platinum, Palladium, Iridium and Silver Sols were made on these lines. The cathode is the chief participant in the disruption.

Mollinari's Chemistry, Vol. I., 1912, p. 103–105, gives brief details of **Bredig's Process** for making a Hydrosol of Gold (*see* Edn. XIX., p. 366).

Theo. Svedberg and others have improved upon Bredig's process. Of the non-metals, Carbon, Silicon, Selenium and Tellurium were made in colloidal condition by the method.

High-frequency alternating currents passing between electrodes of the metal immersed in water have been used in making aqueous colloidal solutions of metals. Varying the range of frequency between wide limits, we found the *colour* supposed to be *characteristic of colloidal metals is a result of conditions of the discharge.*

Thus Gold, on altering the frequency, can be made to give a red, blue or purple solution; in the red solution the particles are negatively charged and in the blue solution positively charged. The purple solutions contain both kinds of particles. The red solution is converted into blue by the action of an electrolyte or electric field.

Numerous Patents have been taken out for making Colloids ranging from the year 1911—many of these have lapsed by time. *For a résumé see Edn. XIX., p.* 367–8.

Our Experience in making Colloidal Metals and their Therapy.
The requisite presence of protective renders some of the solutions indefinite. They may contain *compounds of the metals with protein decomposition products, i.e.*, metals combined as organic salts.

Therapy.—Physiological trials which we have had conducted from time to time during some years show that the Hydrosols are relatively non-toxic. Excess in treatment should be avoided.

The effect may be due to enhanced leucocytosis, the bactericidal power *in vitro* being slight.

Uses.—Infective conditions, *e.g.*, pneumonia, pleurisy, peritonitis, influenza, typhoid, tuberculosis and other febrile conditions, have been treated by subcutaneous, intramuscular and intravenous injections. They have also been used locally in cystitis, gonorrhœa and epididymitis.

Copper and Selenium have been tried in malignant disease.

The late Sir W. M. Bayliss held that a drug in the colloidal state does not necessarily acquire any special therapeutic qualities.—B.M.J. i./23,193; L. i./22,38.

Aluminium Hydroxide, Antimony Sulphide, Arsenic Sulphide and Bismuth Hydroxide Colloids under the T.M. ✱Collobell No. 429532 are in commerce.

✱**Oscol** (T.M. 305256) **Stibium.** *Dose.*—1 to 4 Cc. intramuscularly in leprosy.—F. G. Cawston, B.M.J. ii./20,76,855.

Dose used 2·5, 3 and 6 Cc. on consecutive days. Three weeks later 4·5 and 6 Cc. on consecutive days. Results encouraging.—G. H. Wildish, B.M.J. i./22,55.

Leishmania Infantum.—Treated by colloidal Antimony Sulphide, 0·001 Gm. per Cc. *Dose.*—3 Cc. intramuscularly (buttocks), daily, on alternate weeks. In a fortnight, spleen had decreased in size, and in 4 weeks regained normal position, but patient died from hæmorrhage (epistaxis).—R. Samut, L. i./22,995.

Pulmonary Tuberculosis.—0·5 Cc. intramuscularly into the flexor muscles of the arm twice weekly, of value; the treatment can be carried out in the out-patient clinic without fear of untoward reactions. No ill-effects from some thousands of injections. Injections might be continued until physical signs have cleared up.—P. Moxey, B.M.J. i./27,374.

'Creeping eruption' successfully treated with intramuscular Colloidal Antimony or intravenous Tartar Emetic injections.—F. G. Cawston, B.M.A. Ann. Meeting, B.M.J. ii./28,207.

Calcium. (The Calcium is in *a state of combination, not present as such*). *Dose.*—0·5 Cc. to 1 Cc. *hypodermically* under the skin of the back of the forearm every 5 or 7 days. Strength 1 in 2000. Protective used is Glutaminic Acid obtained from Gelatin.

Tuberculosis has been treated with improvement in temperature, hæmoptysis and night-sweats.

In addition to the injections (0·5 Cc. or less for children) to be given first, then wait a week to see if there is reaction, Calcium Lactate *per os*, two or three grains one, two or three times a day. Many cases do not need an injection oftener than once a fortnight.—E. E. Prest, B.M.J. ii./22,283. See also T. C. Graves, L. ii./22,957.

Empyema, ischio-rectal abscesses, and hay fever have been well treated with Colloidal Calcium.—E. E. Prest, B.M.J. ii./27,958.

Calcium Oleate (✱Collobell) 0·05%. *Dose.—per os*, ½ or 1 drachm; hypodermically 0·25 to 1 Cc.

Copper Solution, Colloidal. *Martindale.* Strength 1 in 2,000.

Dose.—5 Cc. subcutaneously, ½ to 1 Cc. intravenously, to be isotonised at time of use. **Sterules 5 Cc. are made.**

Keeping Properties.—Our experience is that this solution keeps only when sterilised and subsequently filled into sealed containers.

Pharmacology.—A dose of 5 Cc. is tolerated by a cat intravenously or intramuscularly.

Isotonisation of the solution is preferable to the omission of salt.

Uses.—For injection into inoperable malignant growths.

ColloidalCopper on the surface of its particles may supply oxygen necessary to prevent abnormal cell growth. Drage found the solution active. 5 Cc. injections were made twice weekly to a patient suffering from carcinoma of the liver with improvement.—L. i./14,1651.

Recurrent cancer growth. Thirty-four injections caused disappearance of a nodule on the liver.—C. Mansell Moullin, B.M.J. i./18,427.

Gold.

Manufacture.—We devised the following :—

Neutralise a Gold and Sodium Chloride Solution with dilute Sodium Carbonate Solution and adjust the strength to 0·05% Au. With 10 parts of this solution mix 10 parts of a solution containing the calculated amount of Formaldehyde required to reduce the Gold, reckoning 3HCOH to 2 molecules of the Gold Compound. Employ Gelatin as protective. Warm to effect reduction. It can be boiled to sterilise. The finished **red** Hydrosol is to contain 0·025% (1 in 4,000) Gold and the same amount of protective.

Physiological Report.

Rabbit, Wt. 2·3 *kg.* injected intravenously on successive days with 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc.

Result.—Well tolerated except for slight dyspnœa after the dose of 5 Cc.

Two days after the last dose (10 Cc.) of Colloidal Gold this rabbit was given 10 Cc. of Colloidal Selenium, which produced slight dyspnœa.

A method of preparation.—H. Nicol, J.C.S.I., '28,47,343T, per Qtrly. Jl. Ph., '29,115.

Sterules of Colloidal Gold Solution 0·025% containing 5 Cc. are prepared and are suggested for injection. The solution may be approximately isotonised by adding 1 Cc. of 5·5 per cent. Sodium Chloride Solution at the time of use. **Sterules** of this **Salt Solution** are made.

Dose.—Suggested 5 Cc. = 0·00125 Gm. ($\frac{1}{50}$ grain approx.) increased, intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Neurasthenia, Alcoholism and Morphine Habit treated by Colloidal Gold. In epilepsy, alcoholic neurasthenia and migraine this colloidal preparation has been given *hypodermically* four times daily (usually, 2 Cc. divided over the day, but this may be increased) with bitter tonics and digestives, every two hours, *per os.* Details of remarkable cases. Natural sleep was restored, appetite returned and nervous symptoms disappeared; no ill effects. Addiction of long standing cured.—D. E. Stanford Park, L. i./22,691; ii./26,121. See also Jl. of Inebriety, April '24. Gradual reduction for drug addicts successful at Bay Mount.—Stanford Park, L. i./30,53.

Tests against control inert isotonic solutions similarly coloured showed that patients treated with Gold picked up more rapidly and were more successful.—P. Bonsfield, L. ii./25,1150. See also our p. 554.

Iodine. (*Non-Metal.*)

Colloid Iodine Sol 1 in 2,000.—*Martindale.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**) diluted *per os.* *Not suitable for intravenous use.*

Manufacture.

May be prepared by acting upon Sodium Iodide with Sodium Nitrite in Acid Glucose Solution. The Nitric Oxide evolved must be removed.

Tests.—To 5 Cc. of a Colloidal Iodine preparation in a test tube add ½ Cc. Carbon Bisulphide or Chloroform, shake and allow to separate. The solvent will be of a fairly deep violet colour, which is not increased by adding a little Sodium Nitrite and Hydrochloric Acid, showing that all the Iodine is in the free condition.

The Iodine in preparations of commerce found to be far below the strength stated and not in the colloidal form.—Prof. A. J. Clark, B.M.J. i./23,273.

***Collosol** (T.M. 350478; 'Collosols,' T.M. 473310) **Iodine** is supplied in liquid and paste, ointment and oily form.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) twice or thrice daily after meals. Intravenously 10 to 200 Cc.

Uses.—As a substitute for alkaline Iodides, *e.g.*, in syphilis, rheumatic affections, tuberculosis, bronchial and nasal catarrh.

For rheumatic affections the preparation is advised by iontophoresis. Collosol Sulphur to be given internally. For catarrh, the effect is to render mucous secretion more fluid and less adherent.

Intravenously as much as 300 Cc. have been injected in pyæmia and to produce softening of fibrous tissue.

Pasta Collosol Iodine (PASTE FORM) for local use only.

For long standing ulcers effect is rapid. It is suggested to apply alternately with the similar preparation Pasta Collosol Argentum for bactericidal effect. The *oil form* (3%) and *ointment* are used for chilblains and ulceration.

Iron.—A stable Hydrosol of *Metallic Iron* is difficult to make.

Liquor Ferri Dialysatus, B.P. '85, is a colloidal solution of Ferric Hydroxide, unprotected.

*IDOZAN (T.M. 419403). Described as a 'Colloidal Iron Concentrate,' containing 5% of Iron.

Dose.—1 drachm thrice daily after meals, increased to 1 tablespoonful.

Has been used in the treatment of anæmic conditions, especially such as are due to an impaired regeneration of blood.

Lead.

Pharmacology.—A colloidal preparation, actually *Lead Albuminate,* of strength 1 in 500, prepared by us in 1926, in Sterule form 2·5 Cc. with 0·1% Tricresol, was found to be remarkably tolerated by rabbits. A total of 0·03 Gm. of actual Lead in the form of Albuminate was tolerated. No anæmia was produced.

A similar strength preparation of Lead, as *Lead Sulphide,* which we made, was also tolerated in the same dose. In this instance there was found some impairment of the organs, liver, etc., on *p.m.* examination.

Lead Treatment of Malignant Disease.

Malignant neoplasms appeared to be arrested by **Colloidal Lead intravenously.**—Prof. W. Blair Bell, L. ii./22,1006. Lead workers are apparently immune. Lead thought to be the best agent known at the time for destroying chorionic epithelium.—L. ii./24,139; i./26,657.

The toxic effects of Lead administered intravenously, using Lead Acetate, Colloidal Lead, Lead Iodide, and compounds of Lead with Thyroiodin and Hæmoglobin.—Prof. Blair Bell, W. R. Williams and L. Cunningham, L. ii./25, 793.

The specific character of malignant neoplasia, and the action of Lead on malignant growths.—Prof. Blair Bell, L. ii./25,1003.

Prof. Blair Bell adopted the unfruitful trophoblastic (or chorionic) hypothesis of the nature of cancer which was first put forward by J. Beard (L. i./02,1758). —J. A. Murray, L. ii./25,1142.

Intravenous injections of a **Colloidal suspension of Lead** ("**M.A.**") containing 0·1% Mercury and 0·1% Lead, *i.e.*, 1½ grains of Lead per 100 Cc., and a similar quantity of Mercury, combined with X-ray treatment, gave a decidedly beneficial effect in a case of inoperable cancer. The dose ranged from 2 to 20 Cc., a total of 368 Cc. of Colloidal Lead, containing 5½ grains of Lead, being given over a period of nearly two years. Minimum danger of immediate shock or toxicity.—F. Coke and J. B. Cook, B.M.J. i./26,416.

15 Cc. doses of a solution of not less than 0·5% Lead used with no unpleasant reaction. It is important to avoid bad colic, vomiting and poisoning due to the use of soluble salts.—Frank Coke and J. B. Cook, B.M.J. i./27,818.

The connection of lead poisoning with the comparative immunity of lead workers from cancer.—Prof. Blair Bell, B.M.J. i./26,432.

Debate at the Medical Soc. of London.—B.M.J. i./26,568.

The ***fatal amount of lead*** is a little more than 0·2 Gm. when given in a *single dose*. Intravenous use.—Prof. Blair Bell, L. i./26,537.

A. Leitch very sceptical of the whole matter.—L. i./26,658.

Use of Colloidal Lead in prevention of recurrence of malignant disease after operation is a matter so important that every case subjected to operation for cancer, whether the disease be believed to be totally eradicated or not, should be treated as if the patient still had the disease. Thirty-one cases out of 200 believed cured between Nov., 1920 and Nov., 1925.—Prof. Blair Bell, B.M.J. i./26,687.

Liverpool Cancer Research Organisation.—The lead suspension in use at Liverpool contains metal, hydroxide, and a little carbonate and is made electrically, and contains 0·5% Lead. In serum, the Lead in suspension is converted to the extent of 85% into Lead Phosphate, $Pb_3(PO_4)_2$. It then may perform the function of rendering the tumour less permeable and tend towards the production of encapsulation.—W. C. M. Lewis, B.M.J. ii./26,920; L. ii./26,281.

Plans, Co-ordination of Workers, etc.—Prof. Blair Bell, B.M.J. ii./26,919.

5 Cc. of a 0·5% Colloidal Lead preparation is given without effect intravenously to rabbits, but colloids differ. The preparation of Prof. Lewis found safe intravenously, but slow injections desirable.—Prof. W. J. Dilling, B.M.J. ii./26,924.

Histological Changes in Cancer Tissues under Lead.—Most human patients with malignant disease complain of pain in the region of the neoplasm within a few hours of the intravenous injection. At least 40% of the Lead given intravenously to cats is deposited in the liver within two hours of injection. Details of examination of a human case 30 hours after treatment. —E. E. Glynn, B.M.J. ii./26,928.

Colloidal Lead in sublethal doses produces profound changes in animal (rat) tumours—in a small percentage of cases leading to permanent cure. The necessary dose also induces serious, but not irreparable changes in the liver and blood-forming organs.—F. C. Wood, B.M.J. ii./26,928.

Clinical effects of Lead in treatment.—Dosage has been two doses of 20 Cc. and two of 15 Cc. when possible, at an interval of 10 days between each. Then a month's rest. At the end of this time suitable doses amounting to 10 Cc. at intervals until a total of 120 Cc., *i.e.*, 0·6 Gm. of Lead, is reached. In cases where the tumour is of slow growth give smaller doses from the first. Interesting data of cases, showing arrest of growth, etc., in 41 of 227 cases treated.—L. Cunningham, B.M.J. ii./26,931.

A method of preparing Colloidal Lead by subjecting a solution of Gelatin 0·4% and Glucose 0·5%, adjusted to pH 7·2 to 7·6, to the high frequency arc between Lead electrodes of about 10,000 volts, the solution being kept cold. The colloid is brown-black in colour, and is not readily oxidised.—F. Bischoff and N. R. Blatherwick, Jl. Ph. & Exp. Ther., May, '27,27.

Colloidal Lead.

Two cases well treated in private practice—carcinoma of the breast and carcinoma of the rectum. Appreciable improvement following courses of ntramuscular injections—12 Cc. at weekly intervals, with small injections

locally into the nodules, a total of 12 grains of Lead being given in one case and 10 grains in the other. No acute toxic symptoms. The treatment does not appear to merit such wholesale condemnation and adverse criticism as it has received.—E. Talbot, B.M.J. ii./28,1035.

The combined action of Colloidal Lead and radiation caused disappearance of tumours (experimentally) in doses which, by themselves, only result in temporary retardation.—J. C. Mottram, B.M.J. i./28,132.

Chemotherapy in malignant disease.—W. Blair Bell, L. ii./28,164.

Correct liver function necessary. Extent and interval of dosage dependent on existing damage.—L. Cunningham and M. M. Datnow, L. ii./29,655.

Colloidal Lead preparations should be tested to be sure that they are free from toxic effects on rabbits, and that they cause only negligible fall in blood pressure. Myocardial disease a contraindication.—W. J. Dilling, Jl. Ph. & Exp. Ther., April, '29,461.

Results in 40 cases confirm Blair Bell's contention, that in a few persons with inoperable and advanced neoplasms arrest of disease may be obtained from combined use of Lead and X-rays.—L. C. Knox, Jl. A.M.A. i./29,108.

65 successes out of 305 cases treated, *i.e.*, 21·5% of successful results. No one would suggest that possession of a knife is all that is required for surgical cure of cancer of the stomach, yet some seem to think that for Lead Therapy all that is required is that Lead shall be pumped into the veins.—W. Blair Bell, B.M.J. i./29,437.

Lead Selenium Colloid in cancer.—A. T. Todd, L. i./27,575.

Suspension of Lead Selenide (D.4S) in a gum ghatti solution of strength Lead (metal) 0·4% and Selenium 0·04% used in cancer.—A. L. Taylor and E. Lloyd, P.J. ii./28,542.

Colloidal Lead Phosphate and Tetra-Ethyl Lead appear to be the only Lead compounds suitable for use intravenously in cancer. Tetra-Ethyl Lead emulsion is prepared by shaking 1·6 Gm. commercial Tetra-Ethyl Lead with a mixture made up of 150 Cc. water, 25 Cc. saturated Lecithin suspension and 10 Cc. 1% Sodium Oleate solution. Prepare freshly and shake vigorously before use.—F. Bischoff and others, Jl. Pharm. & Exp. Therap., Sept., '28,109.

Lead Selenide Hydrosol preparation by passing Hydrogen Selenide into a solution of Lead Acetate and Gelatin 5%.—B.C.A., '28,A.704.

X-radiation or Radium should be applied with extreme caution, if at all, in cases recently treated with Colloidal Lead Selenide (D 4S).—A. T. Todd and H. M. Aldwinckle, B.M.J. ii./29,800.

Lead Selenide, used intravenously at weekly intervals. The dose ranges from 1 to 5 Cc. initially. Has low toxicity. A rabbit will tolerate 4 Cc. per kilo. As much as 33 Cc. has been given in one dose in man without adverse effects. Reactive effects—pain—thought due to protein poisoning from break-down of cancer tissue. Explanation of action not yet proved. It is thought to be a stimulus to the defence put up against the irritation on invasion of a malignant neoplasm. Combination of radiation with Selenide being worked out. An addition to treatment is Calcium Chloride, to prevent Lead accumulating and furnish a depot for Calcium Assimilation. Vitamin D and Thyroid as tonic and anti-infective. Liver Extract to combat anæmia.—A. T. Todd, L. ii./30,389.

W. Blair Bell criticises Todd's Lead Selenide.—L. ii./30,550. Reply.—The Lead ion may only be a vehicle for the Selenium.—*ibid.*, 611. Reply *ibid.*, 667. Date of priority of Lead Selenide discussed.—*ibid.*, 713.

When expense of the treatment is weighed against possible good effects it seems that Lead Therapy is not the solution to the cancer problem.—A. Soiland and co-workers, Jl. A.M.A. i./29,106.

Lead Selenide not curative of cancer.—M.R.C. Ann. Rept., 1928-29, B.M.J. i./30,560.

Colloidal Lead Iodide, containing 0·2% Lead, isotonised by means of Glucose, and containing a trace of Thyroid Extract (less than 0·02%) and a trace of Cresol as preservative, injected intravenously in inoperable carcinoma with complete absence of reaction, and with beneficial results in selected cases, *e.g.*, growths of the solid variety or in the solid viscera, or in situations which are not vital.—D. C. L. Fitzwilliams, B.M.J. i./27,758.

Colloidal Lead Phosphate as a substitute for Colloidal Metallic Lead was relatively non-toxic to rats and rabbits. Method of preparation given.—F. Bischoff and N. R. Blatherwick, Jl. Ph. and Exp. Ther., Sept., '27,361.

Manganese.

Colloid Sol Manganese.—*Martindale,* 1 in 400.

Manufacture.—By double decomposition of Manganese Chloride and Sodium Hydroxide, using Glucose as protective. Supplied in two separate solutions, each containing 0·5% Phenol.

The Sodium Chloride Content is 0·53%. For use, mix equal quantities of the two solutions.

PHYSIOLOGICAL EXPERIMENTS.

Subcutaneously in rats 1 Cc. of combined solution given on two consecutive days produced only slight malaise and the animal recovered completely.

Intramuscularly, in cats under observation three weeks, 2 Cc. doses of combined solution at weekly intervals were followed by loss of appetite. There was, however, complete recovery. Effects in man should be carefully watched before giving large or frequent doses. It has not, however, appeared in these experiments that 2 Cc. doses would be dangerous for man unless prematurely repeated.—May 11/20.

✱**Collosol Manganese** is supplied in two solutions, to be mixed at the time of use, producing a 0·25% solution. Also supplied ready mixed in ampoule form.

Uses.—Gonorrhœa and sequelæ, also eczema, acne and quinsy, have been treated by it—(*cf.* Pallamine).

Gonorrhœal ophthalmia treated by Colloidal Manganese 1 Cc. intramuscularly, repeated, with success.—D. M. Livingstone, B.M.J. i./19,404. Boils cured by Collosol Manganese.—B.M.J. ii./18,160.

Antral and other suppuration treated by injections into subcutaneous tissues, intermuscular septa or the periosseous tissues.—E. Watson Williams, Pr., May, 1920.

Boils and suppurating glands treated by Colloidal Manganese intramuscularly, ½ Cc. doses. May be very painful.—H. E. Waller, Pres., June, '20.

Hodgkin's disease well treated after Sodium Cacodylate had failed to improve.—R. Samut, L. i./22,17.

Psoriasis treated—6 to 16 intramuscular injections.—J. Moore, B.M.J. ii./22,41. Urticaria treated.—B.M.J. ii./23,563.

✱**Collosol Manganese (Oral).**

Dose.—A teaspoonful two or three times daily alone or in water.

In middle ear affections, internal nasal carbuncle, severe carbuncle on face, and erysipelas.

Mercury.

Manufacture.—By reducing Mercuric Chloride with Hydrazine, employing Gelatin as protective. Dialyse subsequently and adjust to 1 in 2,000.

Physiological Report.

Rabbit wt. 2·0 *kg.* injected (intravenously on successive days) with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the 5 Cc. dose.

Sterules of Colloidal Mercury Solution are prepared containing 5 Cc. of 1 in 2,000 Solution=0·0025 Gm. (1/25 grain) Colloidal Mercury. May be isotonised at the time of injection by 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc.=0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In syphilitic affections; see also Therapy in general, *antea*, and **Collosol Hydrargyrum**, *postea*, under Collosol Argentum.

Palladium, Colloidal Palladium. *Syn.* **Pallamine.**

Colloidal Manganese is most efficacious in gonorrhœa in the acute stage, but as there is delay after injecting it before its maximum oxidising power is reached, Palladium has been suggested to precede.—J. E. R. MacDonagh, B.M.J. ii./18,31.

EPILEPSY well treated by Pallamine. ½ Cc. doses intramuscularly at 3 day intervals.—A. C. King-Turner, B.M.J. ii./18,255.

Platinum.

Manufacture.—This Colloidal Solution we found best prepared chemically by reducing a Platinous Salt, *e.g.*, Chloro-Platinite of Potash of commerce with Hydrazine in the presence of Gelatin as protective. A Colloidal Solution made in this way after previous dialysis can be adjusted to strength 1 in 4,000 (0·025%).

Physiological Report.

Rabbit wt. 2·3 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 9 Cc.

Result.—Well tolerated except for slight dyspnœa after the largest dose.

Sterules of Colloidal Platinum containing 5 Cc. of 0·025% solution are prepared=0·00125 Gm., Platinum (1/50 grain). May be isotonised for use with 1 Cc. of 5·5% Sodium Chloride.

Dose.—Suggested, 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain) intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Intravenously 3 to 7 Cc. Colloidal Platinum caused a rigour in ½ hour, followed by rise in temperature to 104 or 105° F. with perspiration, sickness and headache. Temperature then fell to subnormal—this reaction occurred both in normal subjects and those suffering from diseases characterised by moderate pyrexia—namely subacute pleuritic and pneumonic conditions, and protracted paratyphoid fever—the fall of temperature coincided with a great improvement in the general condition to a great extent—results attributed to a great extent to the Peptone used as protective.—A. G. Auld, B.M.J. i./18,195.

Selenium.

Manufacture.—An Alkali Selenide is treated with acid in presence of protective colloid. The colloidal solution is to be isotonised with Saline at the time of use, to render it approximately isotonic with the blood.

Physiological Report.

A recent report was to the effect that 3·5 Cc., 5 Cc. and 10 Cc. injected into the ear vein of a rabbit at about 1 hour intervals were tolerated and the preparation was deemed *entirely non-toxic.*

Sterules of Colloidal Selenium are prepared containing 5 Cc. of 1 in 5,000 Solution=0·001 Gm. (1/64 grain) Selenium. The solution may be approximately isotonised by adding 1 Cc. of 5·5% Sodium Chloride Solution at the time of use. **Sterules** of this **Concentrated Saline** are prepared.

Dose.—Suggested, 1 to 5 Cc. hypodermically, intramuscularly, or intravenously.

Uses.—Has been suggested for use in malignant disease—see also Therapy in general—*antea*, and **Lead Selenide.**

A preparation of colloidal selenium was tried on mice and rats with grafted malignant growths, but without effect. This preparation was non-toxic, whereas that of Wassermann (Selenium and Eosin) is described as being highly toxic. Other compounds of selenium and eosin, found by experiment to be toxic, were tried, but none of these had any selective action on the tumour cells.—C. E. Walker, L. i./12,1337.

Collosol Selenium effected diminution of pain when used intramuscularly and intravenously.—E. Watson-Williams, B.M.J. ii./10,463,516.

Malignant disease treated by 'Selenium.' Large doses (5 Cc.) 'spell disaster.' Temporary improvement only can be expected.—A. S. Gillett and C. P. G. Wakeley, L. i./22,804; B.M.J.E. ii./22,15.

Intravenous injections daily for 10 days of 5 to 10 Cc. of a 1 in 2,000 isotonic solution definitely and undoubtedly ameliorates patient's condition and

prolongs life in many cases of gastric cancer. Absolutely safe and no contra-indications. Repeat treatment after interval of 10 days or a fortnight. Three courses may be given in 3 months, and possibly more, depending on progress of patient.—Stanley Wyard, Diseases of the Stomach, p. 358.

Silver.

Manufacture.—Mix 250 Cc. of 30% Ferrous Sulphate Solution with a Solution of 140 Gm. Sodium Citrate in 250 Cc. of Water. Pour this mixture into 250 Cc. of 10% Silver Nitrate Solution with continual stirring. Wash by decanting with Sodium Citrate Solution 5%, dissolve precipitate in Water, and precipitate again with Sodium Citrate (twice), until it is practically free from Iron. In this manner a dark grey colloidal solution of strength 1% is prepared, which must contain protective Colloid. Finally adjust to the strength 1 in 2,000 for use.

As an alternative it is stated that well washed Silver Oxide may be reduced by a rapidly stirred 60% Formalin.—A. Pickles, Chem. News, 1918,117,358. Y.B.P., 1919,109.

Hydrazine Hydrate (1 in 2,000), Hydroxylamine Hydrochloride and Hypophosphorous Acid have also been used to reduce silver.

Physiological Report.

Rabbit wt. 1·85 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for slight dyspnœa after largest dose.

Sterules of Colloidal Silver containing 5 Cc. of 1 in 2,000 Solution are prepared. May be isotonised with 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc.=0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In gonorrhœa and cystitis *cf.* also Therapy, p. 364.

Collosol Argentum (1 in 2,000).

Dose.—Hypodermically 15 or 30 minims (**1 or 2 Cc.**). *Per os*—One drachm (**3·5 Cc.**) (on an empty stomach, as it inhibits digestion). Gargle.—One part diluted with three of water. (Dilution is necessary on account of frothing of Collosols.) Eye Drops.—A few drops instilled between the eyelids or as douche diluted with 3 times quantity of water. *Locally.*—Undiluted or diluted with 3 to 4 parts of Saline Solution (1%), as a swab or lotion.

It is chemically prepared. Precipitation by the blood does not occur immediately on hypodermic or intravenous injection.

Uses.—For septic wounds, and ulcers, gonorrhœa (*et sequelæ*), cystitis, dysentery, hæmorrhoids, and nose, ear, eye, mouth and skin infections. Pyorrhœa alveolaris has been treated by 2 to 3 minim injections into the sockets of the teeth. Sprue has been treated by internal use. Whooping cough has been treated by spraying.

Bactericidal power. Destructive to the *meningococcus*, also anthrax and typhoid organisms. After 2 Cc., and subsequently 3 Cc., injections intravenously in rabbits, the particles could be found in the cerebro-spinal fluid, brain and urine.

Pasta Collosol Argentum is also made for use to wounds, burns, skin affections, chilblains and hæmorrhoids. Acne has been well treated.

Collosol Hydrargyrum is of similar strength, dose and properties.

Collosol Argentum Beta is 1 in 400, *i.e.*, 5 times the strength of the ordinary preparation. To be diluted with warm water or normal saline.

Sulphur.

Manufacture.—A 1 in 1,000 opalescent Colloidal Sulphur Solution is made by decomposition of a mixture of Sodium Sulphide and Sodium Sulphite with acid in the presence of protective colloid.

Sterules containing 2 Cc. of 1 in 1,000 solution isotonised at the time of use with 0·4 Cc. of 5·5% Saline. *Dose suggested*, 1 to 5 Cc. (=0·001 to 0·005 Gm.).

For use in skin affections and wherever Sulphur is indicated through excessive elimination.

Sulphur Collosol (1%).

Dose.—*Per os* 2 to 4 drachms (**8 to 15 Cc.**) in a wineglass of water twice daily during or after principal meals. Subcutaneously or intravenously, 1 to 2 Cc.

Uses.—Rheumatic and skin affections are relieved.

For Injections in rheumatism, v. also Sulphur chapter.

The ✱ "**Oscol**" (T.M. 305256) brand of **Silver** has been used in gonorrhœa, septic conditions of the nose, throat and ear, and in wounds, cystitis and acne. Oscol **Mercury** in syphilis and tonsillitis. Oscol **Iodine** in all cases where this halogen is indicated. Oscol **Sulphur** in rheumatic affections.

Electrically Produced Colloids.

General Directions.—

In making these colloidal solutions electrically, by working from the main, our experience is that the intensity of current necessary is considerable—the ordinary wiring for lighting is not sufficient. Special wiring is required as in the case of a power circuit. With this latter, resistance can be introduced so as to adjust the intensity to about 8 ampères. The intensity necessary varies with the type of metal. Pure Distilled Water must be used and the electrodes must be so arranged as to produce a uniform arc beneath the surface. After sparking for sufficient time the solution is standardised.

Copper.—We prefer the **Chemical Method** for this—*q.v.*

Electrocuprol.

Dose.—1 to 20 Cc. intravenously, isotonised with Saline.

A brown solution described as a colloidal solution of Copper Oxide containing 0·15% Copper. Ampoules 5 and 10 Cc. are prepared.

Uses.—In malignant disease and tuberculosis.

Gold.—We have prepared Colloidal Gold Solution (1 in 4,000) electrically, as described under general directions, the product being bluish purple. The chemical method is better *v. antea*.

✱**Orargol** (T.M. 453759).

Ampoules contain 5 Cc. for intramuscular or intravenous injection. A preparation of Colloidal Gold (0·01%) and Silver (0·09%). It is stated that if injected in time it will cut short a serious case of pneumonia, influenza, or erysipelas. Has also been used in bronchitis, endocarditis, and acute articular rheumatism.

Encephalitis lethargica of severe type successfully treated by injections of Electro Colloidal Gold and Silver.—A. W. Fuller, L. ii./26,172.

Iodine.—The following are available. (See also chemically produced.)

Iodeol.—An electrically prepared Colloidal Oily Iodine Solution containing 0·2 Gm. of Iodine per tube of 1 Cc.—a dose by intramuscular injection. Has been used in pulmonary and rheumatic affections.

It is stated that 10 minutes after "application upon the skin" Iodine can be found in the urine.

Capsules containing 0·25 Gm. Iodine, and **Ovules**, are prepared.

Iodargol is similar, containing 0·4 Gm. of Iodine per tube. Stated to be a non-toxic, painless solution for injection by means of an urethral syringe in gonorrhœa and allied infections.

Silver.—A 1 in 2,000 solution can be made. The **Chemical** method is however preferable.

***Electrargol** (T.M. 351388).—A reddish brown solution ('stabilised') containing 0·025% of Silver.

Dose.—1 to 10 Cc. intramuscularly, after rendering isotonic with saline (supplied). Ampoules 5, 10 and 25 Cc.

Uses.—In diseases of the genito-urinary organs and infective diseases in general. Intrapleural injections of 15 to 50 Cc. have been made in pleurisy.

Antiseptic Powers of Colloidals, see Vol. II., 'Colloidals.'

For a number of early Refs., see 17th Edn., p. 366, *18th, p.* 366, *et seq., and 19th, p.* 361, *et seq.*

COLOCYNTHIDIS PULPA.

Bitter Apple.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

The dried pulp or pith of the fruit of *Citrullus Colocynthis* (*Cucurbitaceæ*) freed from the seeds. Has a markedly bitter taste, is free from starch, and contains only about 3% fixed oil or less (2% *B.P.* '14 and U.S. X.) whereas the seeds contain 15% or more. Is imported from Smyrna (the best) and Spain. According to U.S. X. must not contain more than 5% of seeds, nor more than 6% of acid-insoluble ash. P. Ital V. *Syn.* COLOQUINTIDE, COCOMERO AMARO.

Antidotes.—Spirit of Camphor 10 drops on sugar or in milk every ¼ hour, Laudanum 30 minims (by rectal injection if not able to swallow). Stimulants, demulcent drinks, apply warmth.—Murrell

Colocynth Poisoning. A teaspoonful and a half proved fatal.

Literature shows that nearly all cases where doses of 110 grains and over have been taken have ended fatally.—R. B. Roe, L. i./13,1527.

Uses.—A drastic cathartic. A frequent ingredient in aperient pills. For formulæ *see* Index, "Pills."

Extractum Colocynthidis Compositum (*B.P.* '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

This is in powder form, made by extraction of Colocynth Pulp, and adding Extract of Aloes, Scammony Resin, Curd Soap in powder and powdered Cardamom Seeds.

Extractum Colocynthidis. U.S. X. *Average dose*, ½ grain. Made with Diluted Alcohol, reducing the extract to powder and diluting with Starch so that 1 of extract equals 4 of drug.

Pilula Colocynthidis Composita (*B.P.* '14).

Dose.—4 to 8 grains (**0·2 to 0·5 Gm.**).

Contains Colocynth Pulp, Aloes, Scammony Resin, Potassium Sulphate, and Oil of Cloves with Water *q.s.*

Pulvis pro Pilula Colocynthidis Composita consists of the ingredients of the pill less the water. Is more convenient for dispensing.

Ⓟ **Pilula Colocynthidis et Hyoscyami** (*B.P.* '14).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Compound Colocynth Pill 2, Hyoscyamus Extract 1, with Water *q.s.*

This is a Ⓟ Poison—*cf.* P.J i./26,13,23.

℗ **Hamilton's Pill.**
Compound Extract of Colocynth 2, Hyoscyamus Extract 1
Made into 4 grain pills. Stated to be less griping than the last.

Tinctura Colocynthidis, P.G.VI.
Dose.—3 to 15 minims (**0·2 to 1 Cc.**). (Maximum single dose 1 Gm.; maximum daily dose 3·0 Gm.). Strength 1 in 10 alcohol (90% P. Ital. V. 1 in 10 using 80% alcohol.

Colocynthin. $C_{56}H_{84}O_{23}$=1124·6552. The active principle, glucoside, of Colocynth in the form of an amorphous yellow powder. Has been employed as a hypodermic purgative.
Dose.—15 minims of a 1% solution in Glycerin, approximately $\frac{1}{6}$ gr.
It occurs to the extent of 0·6%. It readily reduces Fehling's Solution.

CONIUM.

Hemlock. *French*—Ciguë. *German*—Gefleckter Schierling.
Both the dried unripe fruits and the fresh leaves and young branches of *Conium maculatum* (*Umbelliferæ*), collected when the fruit begins to form, were in *B.P.* '98.
Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). U.S. VIII. Standard 0·5% Conine. (Conium is now removed from U.S.P.) Fr. Cx.—*Max. single dose* 4 grains, max. during 24 hours 12 grains approximately.
Conium fruit contains 0·36 to 0·91% of Conine.
For further chemical details on Conium see Vol. II.

ℙ1 **Coninæ Hydrochloridum.** Silky needles soluble 1 in 4 in water.

ℙ1 **Coninæ Hydrobromidum.** Fr. Cx. *Syn.* Cicutinæ Bromhydras. F.E. VIII. $C_8H_{17}N.HBr$=208·0644.
Dose.—$\frac{1}{3}$ grain, increased to 2 grains (**0·02 to 0·12 Gm.**) in pill.
F. E. specifies single dose 1/60 grain (0·001 Gm.), during 24 hours, 1/12 to 1/3 grain (0·005 to 0·02 Gm.).
Colourless crystalline prisms soluble in water 1 in 2 approx.
The Hydrobromide of the liquid alkaloid ℙ1 **Conine** (*a-n* Propyl piperidine). *Syn.* **Coniine, Cicutine** $C_8H_{17}N$=127·1406.
The base is soluble in Alcohol, Chloroform and Acetone and in Water 1 in 80. *Dose.*—Similar to that of the salt.
Incompatibility.—Conium preparations are incompatible with alkalies and preparations containing Tannin.
Antidotes.—Stomach tube and emetic. Give Tannic Acid and wash out the stomach again. Stimulants; artificial respiration.
Uses.—Conium and Conine Hydrobromide act as direct sedatives to the respiratory centre; in poisonous doses death is caused by asphyxia. Employed with advantage in all spasmodic affections, especially for whooping-cough and asthma; in neuralgia, epilepsy, and as a sedative in acute mania.

℗ **Injectio Coninæ Hydrobromidi Hypodermica.** 1 grain in 20 minims. *Dose.*—1 to 3 minims (**0·06 to 0·2 Cc.**).

℗ **Pessus Coninæ.** Conine $\frac{1}{2}$ minim, Gelatin Mass 20 grains.

℗ Tinctura Conii.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

We prepare this with Conium Fruit No. 40 powder, 1 in 5 of Alcohol 60% by percolation, and standardise to 0·1% Conine.

A quantity of Conium Fruit was made into Tincture in the usual way. It was divided into two parts, one of which was labelled and set aside. All the alkaloids were removed from the other half and afterwards dissolved in slightly acidulated water, and the solution made up with Alcohol to volume. These preparations were examined by Wm. Findlay at Aberdeen University. *There was not the slightest difference in effect* between the two. The query is put as to whether the same would hold good for any of the other so-called alkaloidal drugs? It is suggested to produce a series of colourless Tinctures of standard strengths, containing all the alkaloids in the proportions fixed by nature.—R. Wright, P.J. i./26,256.

℗ Extractum Conii Liquidum, B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Conium Fruit 100 in No. 40 powder is exhausted with alcohol 60% containing 1·25% of acetic acid (33%), the last portion of percolate concentrated and mixed with the first 85 previously set aside, so as to produce a Liquid Extract "containing alkaloids equivalent to 1% of alkaloidal hydrochlorides."

℗ Extractum Conii, Fr. Cx. *Extrait de Ciguë, Dose.*—Maximum single ¾ grain (**0·05 Gm.**) approximately, but up to 2 grains are often given to our knowledge—as in Pil. Antim. Conii et Quininæ.

A firm Extract produced by extracting the powdered fruits with 70% alcohol at 35° C., evaporating the liquor and treating the residual extract with water, evaporating the aqueous extractive, rejecting the portion not dissolved. We found an extract which we prepared to contain 2½% alkaloids.

℗ Unguentum Conii.

The author's formula is as follows: Extract of Conium, Fr. Cx. a sufficiency to produce 0·1% total alkaloids in the finished Ointment, the basis of which consists of Unguentum Lanolini. Gives relief in pruritus ani, and for painful fissures.

COTO CORTEX.

Dose, in powder, 1 to 8 grains (**0·06 to 0·5 Gm.**) 4 to 6 times a day. Is imported from Bolivia. Paracoto bark is exported in place of true Coto bark.—*N.O.* probably *Laurineæ.*

Botanical source of Coto Bark given as *Nectandra Coto* by Dr. Rusby. It seems probable that like the Cinchona genus there may be several allied species. —E. M. Holmes, P.J. i./23,240.

Account of Rusby's trip in the Amazon basin to determine the source of Coto bark.—C. W. Mablethorpe, P.J. i./23,238. C.D., 1923, p. 380. Possibly several species of Nectandra contain Cotoin.—Prof. Greenish, *ibid.*, 381.

Uses.—For cholera, and especially the diarrhœa of phthisis, for night sweats, and for gout and rheumatism. It is rich in resins which give it a pungent taste.

Incompatible with Mistura Cretæ.

Extractum Coto Liquidum. 1=1 of bark.

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Tinctura Coto, B.P.C.

Coto Bark bruised 1, Alcohol (90%) *q.s.* to 10.

Dose.—10 to 30 minims every 2 hours with mucilage and syrup.

Mistura Anti-choleraica *Royal Coll. Phys.* Form II.

Aromatic Sulphuric Acid 15 minims, Compound Tincture of Camphor 30 minims, Compound Tincture of Chloroform, Tincture of Coto, of each 20 minims, Syrup of Orange Flower 1 drachm, Peppermint Water to 1 ounce. *Dose.*—1 ounce every 3 or 4 hours. This preparation has been found invaluable. Form I. will be found in the Xth Edition, p. 105.

Ⓟ **Diarrhœa and Cholera Mixture.** (*Board of Health.*)

Aromatic Confection 9 grains, Aromatic Spirit of Ammonia 9 minims, Tincture of Catechu 30 minims, Compound Tincture of Cardamoms 18 minims, Tincture of Opium 3 minims, Chalk Mixture to 1 ounce (=1 dose). The following are also of benefit :—

Ⓟ **Mistura Thielemani.** *Syn.* TINCTURA ANTICHOLERICA THIELEMANI. THIELEMAN'S KOLERADRAABER.

Average Dose.—30 minims (**1·8 Cc.**). Dissolve Peppermint Oil 3 in Alcohol 22 and add to Sydenham's Laudanum (Vinum Opii Crocatum *q.v.*) 10, Ipecacuanha Wine 25, Tincture of Valerian (1 in 5 of Dilute Alcohol) 40.

Ⓟ **Tinctura Anticholerica Conradi.**—CONRAD'S KOLERADRAABER.

Dose.—Over 20 years, 40 drops ; over 5 years, 1 drop for each year. Must not be given to a child under 5 years.

Tincture of Opium (*B.P.* '98) 1, Tincture of Cascarilla and Camphorated Spirit of Ether of each 2, Bitter Tincture of Rhubarb 5.

[**Spiritus Ætheris Camphoratus** is Camphor 3, Spirit of Ether (1 in 4) 17. **Tinctura Rhei Amara** is Rhubarb 10, Cardamoms 1, Gentian 4, Alcohol (70% by vol.) 100, all by weight.]

Ⓟ **Guttæ Inosemzowi.** TINCTURA ANTICHOLERICA INOSEMZOWI. P. Bor. VII. :—

Average dose.—30 minims (**1·8 Cc.**).

Extract of Nux Vomica 1 Gm., Tincture of Opium 120 Gm., Alcoholic Tincture of Rhubarb 480 Gm., Tincture of Castoreum 20 Gm., Spirit of Ether 240 Gm., Ethereal Tincture of Valerian 240 Gm., Oil of Peppermint 5 Gm.

Pulvis Cretæ Compositus, U.S. X.

Average dose.—30 grains (**2 Gm.**).

Prepared Chalk 30, Acacia 20, Sugar 50.

Cotoin.——*Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**) every 2 or 3 hours in pill or diluted mucilage. 4 grains have been used in dysentery.

A bitter principle, in yellow crystalline powder, slightly soluble in water, soluble in alcohol. Melting point, 130° C. The dust is irritating to the nostrils.

Ⓟ CREOSOTUM.

(*B.P.* '14), **U.S. X., P.G. V., P. Austr., P. Ital. V., P. Belg. IV., F.E. VIII., P. Helv., P. Dan., Fr. Cx.** *Syn.* **Kreosotum.** *Data are in Vol. II.*

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), increased to 30 or even 60 minims, in capsules, or in cod liver, almond, or olive oil, or emulsified.

Soluble in alcohol, chloroform, ether, glacial acetic acid, fats and oils, and 1 in about 150 of water.

Creosote (*B.P.* '14) is a mixture of phenols—chiefly guaiacol and creosol. The preparation is Ⓟ.—P.J. ii./30,447.

The variety most used is from **Beechwood.** It contains a large

percentage of Guaiacol $C_6H_4.OCH_3.OH$=124·0974. It mixes clear with Glycerin. It is more soluble in water than the variety from **Pinewood,** which is anhydrous and mixes perfectly with oil of turpentine, consisting chiefly of creosol $C_6H_3.CH_3.OCH_3.OH$: 1, 3, 4= 138·078 homopyrocatechin-methyl-ether (Morson's Creosote is representative of this class). Creosote does not cause collodion to gelatinise when mixed with it in equal proportion.

Commercial Creosote used for timber preservation consists of Naphthalene oils—a mixture of the heavy oil from Coal Tar distilling at 230—270°, with the residues from the middle oil (170—230°), after freeing from Phenols.

For composition of and tests for Creosote, see Vol. II.

Flavoring.—Emulsified, Glyl or Syl Pini excellent, Syl Lavandulæ and Syl Amygdalæ Amaræ are also good ; Mistura Amygdalæ Composita, or Essentia Menthæ Piperitæ.

Uses.—Locally as a caustic. It is one of the most powerful deodorisers, antiputrescents, and antiseptics. It is used internally to correct fetor, given to check sickness, for diabetes, added to cod-liver oil for phthisis and applied externally in various skin diseases, and is put into the cavities of carious teeth. Checks gastric fermentation and is an intestinal antiseptic in some forms of diarrhœa. For irritable trachea and congested larynx, causing troublesome cough, the inhalation of creosote from an oro-nasal or 'ozonic' inhaler is useful. *Hypodermically* was administered in 10% solution in almond oil.

PNEUMONIA and INFLUENZA well treated, 10 minims gently rubbing into the right axilla with the finger repeated on the left axilla if required 10 minims at a time, also ½ minim *per os*. Reduces temperature.—J. E. B. Wells, B.M.J. i./19,481.

PNEUMONIA.—After a wash-out enema, inject slowly well up the rectum 40 drops of pure Creosote shaken in 2 ounces warm milk ; retain for 2 hours. Repeat if not retained for more than ½ hour ; in adults add 10 drops Tincture of Opium. Repeat enema twice in 24 hours. For children under 1 year give 2–10 drops, and older children 5–10 drops, with extra drop for each year. Almost specific in pneumoccocal conditions ; prophylactic in post-operative pulmonary complications and clears up catarrhal states prior to operation.—Ian Macdonald, B.M.J. ii./31,1111. Value queried.—H. Sutherland, *ibid.*, 1198.

Two half drachms having been taken in error is recorded.

Incompatible with silver oxide (*q.v.*). Also with calcined magnesia and slaked lime.

Aqua Creosoti. *Syn.* LIQUOR CREOSOTI. *Average dose.*—2 drachms. Creosote 1 in 100 water freshly prepared.

Elixir Creosoti.—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted at the time of taking.

Creosote 2 minims, Alcohol 90% 10 minims, Syrup of Pine (*q.v.*) and Simple Elixir, B.P.C., 1894, *a.a. p.aeq. q.s.* to 2 drachms.

Haustus (Mistura) Creosoti (Vic. Park).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Creosote 3 to 30 minims, Alcohol 90% 15 minims, Compound Tincture of Gentian 15 minims, Liquid Extract of Licorice ½ drachm, Water to 1 ounce. (If containing 15 minims : Ⓟ.)

Mistura Creosoti et Potassii Iodidi.

Dose.—½ ounce (**15 Cc.**) every three hours until the temperature becomes normal.

Creosote ½ drachm, Potassium Iodide 1 drachm, Alcohol 2 drachms, Liquid Extract of Liquorice 3 drachms, Water to 6 ounces.

LOBAR PNEUMONIA.—The above dose is suitable for adults; for children proportionate quantity. The antiseptic action of Creosote limits the extension of the pneumonic process.

The Potassium Iodide content, it is suggested, should be kept down. A dose of 2 to 3 grains with the Creosote 5 minims is a good expectorant, and depressant action is avoided.—'M.D.' B.M.J. i./22,334.

Mistura Creosoti Composita.

Dose.—2 drachms every 4 hours for a child of 5 years.

Creosote 32 minims, Calcium Carbonate (precipitated) 128 grains, Potassium Iodide 16 grains, Mucilage Tragacanth *q.s.*, Saccharin 8 grains, Oil of Peppermint or Aniseed 5 minims, Water to 8 ounces.

TUBERCULOUS PERITONITIS.—In two children, apparently hopeless cases, the above was useful. Petroleum Emulsion and Cod Liver Oil as further treatment. Abdominal tumours diminished and general health improved. Remarkable recoveries. The mixture has also been found very beneficial in phthisis.—H. Lawrie, B.M.J. ii./13,1433.

Oleum Morrhuæ cum Creosoto.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Contains 1½%.

In ulcerative colitis, Creosote 3 minims, with Cod Liver Oil 1 drachm thrice daily—Castor Oil having been previously given—increased by 1 drachm daily, until on the 4th day 12 minims with ½ ounce respectively are taken combined. Has proved useful.

Ⓟ **Perles of Creosote.** 1 or 3 minims in each, with oil, also **Capsules,** 3 and 5 minims, or more, with oil.

Ⓟ **Creocarb Capsules.** Contain Beechwood Creosote 3 minims and Phenol ¼ gr. In the treatment of phthisis.

Pilula Creosoti.—*Martindale.*

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Creosote 1, Curd Soap, in powder, 1. Digested on a water-bath in a wide-mouthed stoppered bottle. As prophylactic against dysentery, *e.g.*, by soldiers on the march.

To make a pill containing Creosote 2 minims and Phenol 1 grain, use White Wax 2½ grains and Powdered Liquorice 1 grain. Incorporate the Phenol, Creosote and Wax with the powder gently and quickly.—P. Boa.

Spiritus Creosoti.

Dose.—1 drachm. Creosote 1, Alcohol 90% 40. Lessens cough and expectoration in chronic bronchitis and phthisis.

Petrolatum Creosoti.—*Martindale.*

1 of Creosote in 10, employing "*High Melting*" Soft Paraffin.

Unguentum Creosoti.

Creosote 6 drachms, Yellow Wax 180 grains. Melt, and stir till cold.

Used in psoriasis. Caution.—Should not be applied to the abdomen, face, or flexor surfaces of the limbs.

Ⓟ **Vapor Creosoti,** T.H.

Creosote 80 minims, French Chalk 30 grains, Water to 1 ounce C.L.T.E. has Creosote 40 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce.

A teaspoonful (C.L.T.E. a tablespoonful) in a pint of water at

40° F. Useful in chronic congestion of the larynx and trachea, and in ozœna, fetor of breath and syphilitic throats.

Abscess of lung. Creosote is given internally in doses up to ½ drachm, together with inhalations of Creosote and Iodine.

For phthisis, it is more sedative in its action if mixed with an equal volume of spirit of chloroform, 5 to 20 minims employed at one time.

℗**Vapor Creosoti Compositus** (*Syn.* Inhalatio Iodi Composita L.H., Vapor Acidi Carbolici Compositus in earlier Edition).

Creosote 2, Carbolic Acid 2, Iodine Tincture 1, Spirit of Ether 1, Spirit of Chloroform 2.

For early pulmonary tuberculosis by inhalation from a "Burney Yeo" inhaler. *It must be continuous and in operation the whole of the 24 hours,* excepting meal times. Six to 8 drops are used on the sponge of the inhaler every hour during the day, and two to three times during the night if awake. Non-irritating, beneficial and does not cause hæmoptysis. Allays pyrexia and cough.

The antiseptics make their way into the pulmonary alveoli and the slow absorption of the anæsthetic solvents in a dilute condition carry with them the antiseptics into the blood and by the blood stream to the tuberculous foci. The Alcohol must be considered as tonic and stimulating as also the Ether. The Chloroform is locally sedative and reduces cough.

Guaiacol, Phenol and Spirit of Chloroform, adding Turpentine when necessary, have also been used.

℗**Vapor Chloroformi Compositus. L.H.**

Chloroform 10 minims, Liquid Phenol 25 minims, Alcohol 90% 50 minims, Glycerin 35 minims. Quantity for one inhalation: 60 minims, to be added to a quart jug half full of boiling water for inhalation.

℗**Guttæ Cinnamomi Compositæ.**

Creosote 2 drachms, Pine Oil 1½ drachms, Spirit of Chloroform 1½ drachms, Menthol 10 grains (or less), Cinnamon Oil 5 minims. This combination used on a Yeo's respirator is not unpleasant. The inhalation has marked effect in reducing cough—a matter of the utmost importance—it rests the larynx.—Dundas Grant.—L. i./11,262.

Note.—Sir Dundas Grant now uses 3 drachms of creosote.

℗**Solutio Creosoti Composita** (was in **Brompton H.**)

Creosote 1, Spirit of Menthol (20%) 1, Spirit of Chloroform 1, for inhalation.

Morson's Soluble Kreosote.

Dose.—Up to 15 grains (1 Gm.) thrice daily.

A light brown powder, consisting of the Potassium salts of Sulphonated fractions from Beechwood Kreosote. It contains approx. 50% of total Kreosol and Guaiacol Oils. This new preparation is soluble in water with slight flavour and agreeable after-taste. For bronchial affections it is equal to Kreosote.

Creosote Carbonate.—*Syn.* ✱Creosotal (T.M. 216421). Patent 19074/1890 ***Expired.*** U.S. X., Ph. Ned. V., F.E. VIII., P. Belg. IV.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**) or considerably increased.

A light-brown nearly odourless liquid, Sp. Gr. 1·165, insoluble in water, soluble in oils. **Capsules** contain 5 and 10 minims.

It contains the carbonates of guaiacol and creosol. Has been used in tuberculosis, bronchitis, and pneumonia. Breaks up in the alkaline intestinal juices.

Manufacture.—Pass a sufficiency of Carbonyl Chloride into a solution of Beech Creosote 124 in Sodium Hydroxide 40 in concentrated aqueous solution. The liquor separating is washed with weak alkali and water.

PNEUMONIA treated by Creosote Carbonate 15 m. every 3 or 4 hours. Guaiacol Carbonate 5 grains better where tubercle suspected.—A. Fletcher.

Drugs such as Guaiacol, Creosote, and essential oils are partly excreted by the lungs, but it is very doubtful whether the small amount so excreted can produce much effect, and the sputum is certainly not rendered less virulent when injected into animals.—Dixon, p. 239.

Creosote Valerianate.—*Syn.* EOSOTE.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**). **Capsules** 8 minims.

An oily liquid, soluble in alcohol, glycerin and ether; checks gastric fermentation and used for phthisis epidermically. Is not so toxic or corrosive as creosote.

Proposote. *Syn.* CREOSOTE PHENYL-PROPIONATE.

Dose.—10 minims (**0·6 Cc.**).

Administered shortly after meals, it passes through the stomach without causing irritation. The creosote is liberated in the intestine. Useful in tuberculosis and bronchial affections, also in intestinal bacterial infections. Capsules contain 10 minims (equivalent to 5 minims of creosote).

For Guaiacol and Compounds, see p. **444.**

CUPREÆ CORTEX.

Cupreine, an alkaloid, occurs with Quinine in Cuprea Bark from *Remijia pedunculata* and other species.

It is allied to Quinine. Its salts have been similarly employed. It can be converted into Quinine by treating with Sodium in Methyl Alcohol Solution and heating the Solution with Methyl Iodide.

Several Cupreine derivatives have been used :—

Quinine (*Syn.* Methyl Cupreine) is $C_{20}H_{21}N_2O_2 = 324{\cdot}2032$.
Cupreine is $C_{19}H_{22}N_2O_2 = 310{\cdot}1876$.
Hydrocupreine is $C_{19}H_{24}N_2O_2 = 312{\cdot}2032$.
Methyl Hydrocupreine (*Syn.* Hydroquinine) is $C_{20}H_{26}N_2O_2 = 326{\cdot}2188$.
Ethyl Hydrocupreine (*Syn.* Optochin) $C_{21}H_{28}N_2O_2 = 340{\cdot}2354$.

Methyl-Hydrocupreine Hydrochloride. *Syn.* HYDROQUININE HYDROCHLORIDE, $C_{20}H_{26}N_2O_2.HCl.2H_2O = 398{\cdot}7148$.

Dose.—Intravenously 4 to 12 grains (**0·25—0·8 Gm.**) for adults—for malaria and trypanosomiasis. For whooping cough in young children up to 6 months, $\frac{1}{3}$ to $\frac{3}{4}$ grain (**0·02—0·05 Gm.**), 6 to 12 months, $1\frac{1}{2}$ grains (**0·1 Gm.**), from 2 to 14 years, $1\frac{1}{2}$ to 8 grains (**0·1 to 0·5 Gm.**) intramuscularly.

When heated with strong Hydrochloric Acid it loses a Methyl group and is converted into Hydrocupreine, $C_{19}H_{24}N_2O_2$.

Soluble.—1 in 8 of water (by our experiments).

Ethyl-Hydrocupreine. *Syn* ✱OPTOCHIN BASE (T.M. 356220). NUMOQUIN. $C_{21}H_{28}N_2O_2 = 340{\cdot}2344$.

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**). Max. dose during the day 15 grains (**1 Gm.**). Not to be given on empty stomach.

A whitish amorphous powder with bitter taste. Almost insoluble in water, soluble in alcohol, ether, chloroform and dilute acids.

Uses.—In pneumonia treatment should be begun immediately on diagnosis. It has also been used in malaria.

The bacteria in pneumonia are destroyed by Ethyl-hydrocupreine

and even the blood drawn from patients so dosed will destroy pneumococci—our only instance of specific drug therapy in acute general bacterial disease.—Prof. W. E. Dixon, B.M.J. ii./22,410.

In treatment of pneumonia visual disturbances can be safely avoided if *OptochinBase* is administered in single doses of not more than 3 grains (0·2 Gm.) every four hours, day and night: the drug should not be administered longer than for three days, so that a total day's dose of 18 grains (1·2 Gm.), and a total dose for the whole period of 54 grains (3·6 Gm.) should not be exceeded. A regular milk diet should accompany the medication. If the slightest visual disturbance occur, Optochin should at once be stopped.

For children the dose of the base should be much less—at least a quarter or half the above figures.

Unguentum Ethyl-Hydrocupreine 1% in White Soft Paraffin must be freshly made. Efficiency decreases in 3 to 4 days. Used in pneumococcal and gonorrhœal eye affections. *Vide infra.*

The action of the compound on the pneumococcus and of ✱**Vuzin** (T.M. 412133) (Iso-octyl Hydrocupreine) on *B. diphtheriæ* is absolutely specific, and enough can be given by medicinal doses to clear the blood of these micro-organisms.—W. E. Dixon, B.M.J. i./25,814.

Amaurosis following ingestion of a total of 58 grains Ethylhydrocupreine over 3 days.—B. Alvis, Jl.A.M.A. ii./29,1253.

Ethyl-Hydrocupreine Hydrochloride. *Syn.* ✱Optochin (T.M. 356220) Hydrochloride, Ph. Ned. V., $C_{21}H_{28}N_2O_2HCl$=376·6992.

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**). This dose should be given with caution. The *base* (*antea*) should be employed in pneumonia. The hydrochloride may cause grave visual disturbances.

A white crystalline powder soluble in water about 1 in 4.

Uses.—Though given internally in some cases (it has been proved effectual in treatment as a prophylactic of common colds), it is mostly used locally in solution 1 or 2% in eye affections. Its use is at first painful.

Ulcus corneæ serpens has been treated with a 1% **Ointment** (made with the base) or a 1% or 2% **Solution.** A pad of sterile wool or gauze is soaked in the solution and then left on the ulcer for 5 or 10 minutes. After this the 1% solution is *instilled* into the eye every hour or so during the day or the ointment applied 5 to 6 times per diem. *Note.*—Solutions should be freshly prepared. They decrease in efficiency after 3 or 4 days.

In conjunctivitis gonorrhoica, and photophobia accompanying eczematic conjunctivitis, scrofular ophthalmia, and keratitis has also proved useful.

Pneumococcal meningitis treated by ½ grain intraspinal doses together with anti-pneumococcic serum. One case, with Optochin alone, did not respond favourably—referred to by C. Worster-Drought, M.P.C. June 14/22,514.

Inhibits pneumococcus in dilution 1 in 1,000,000.—G. T. Langley, L. i./24,13.

CUPRUM.

Cu = 63·57.

Copper in Chemistry and Pharmacy.—Occurrence, Process of Extraction, and Purification.—G. M. Dyson, P.J. ii./30, 31,76. Medicinal preparations.—*ibid.* 122.

Antidotes to Copper Salts.—Stomach-pump, emetics, white of egg and milk. Hot fomentations to the stomach, barley water, morphine or laudanum to relieve pain.

Colloidal Copper–*see* **Colloidal Metals.**

Incompatibles with Copper Salts.—Alkalis and alkaline carbonates, also preparations containing tannin and iodides.

Adjuvant to Iron in Anœmia.—It is claimed that small amounts of Copper Salts assist effect.—*See Ferrum.*

Cupri Acetas Neutralis. $(CH_3COO)_2$ Cu, H_2O=199·6324.

Dose.—$\frac{1}{12}$ to $\frac{1}{2}$ grain (**0·005 to 0·03 Gm.**).

Dark green crystals. Applied to ulcers acts as a stimulating caustic.

Soluble 1 in 15 approximately of water; only slightly in alcohol.

In tuberculosis has been given with Sodium Phosphate 1 grain, Tragacanth Mucilage $\frac{1}{2}$ ounce, or as **Pilula Cupri Acetatis,** $\frac{1}{6}$ grain in each with Sodium Phosphate 1 grain, Liquorice Powder and Glycerin *q.s.* The fatal dose *per os* is said to be 154—184 grains, and 154 to 308 grains of the Sulphate.

Cupri Subacetas. *Syn.* **Verdigris, Aerugo.**

Is usually of indefinite composition, principally $[(C_2H_3O_2)_2Cu+CuO+6H_2O]$=369·2804, and only partly soluble in water. Occurs in greenish partly crystalline powder.

Linimentum Æruginis. Ph. Lond.

A decoction of verdigris, vinegar and honey, employed in veterinary work.

Cupri Citras. $C_6H_4Cu_2O_7+2\frac{1}{2}H_2O$=360·2162.

Greenish powder slightly soluble in water.

Unguentum Cupri Citratis. *Syn.* **'Cuprung,'** is supplied 5, 10, 15, 20 and 25% strength for use to ulcerations and granulations on the eye-lids. R.O.H. has 5% approx. C.X. $4\frac{1}{2}$% approx.

LEPROSY.—Copper Citrate, dose $1\frac{1}{2}$ grains for an adult intravenously. It is readily made soluble in small bulk by 4 grains of Sodium Citrate.—F. J. Palmer, B.M.J. i./25,884; ii./25,96.

Cupri Oxidum. CuO=79·57.

Is supplied commercially as 'precipitated' by adding Caustic Alkali to Cupric Sulphate solution, washing and drying, also 'granulated' by heating to partially fuse.

Cupri Sulphas. $CuSO_4$, $5H_2O$=249·708.

Average Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**); as astringent $\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**); as emetic 5 to 10 grains (*B.P.* '14).

Blue Crystals. ***Soluble*** in water 1 in $3\frac{1}{2}$, in glycerin 1 in 2 (but may crystallise out again); insoluble in alcohol.

Uses.—Given internally in very small doses for severe diarrhœa and cholera, usually combined with opium (usually $\frac{1}{2}$ grain of each), and has been tried as rectal injection also for internal hæmorrhage and intestinal ulcers. ***Rapid Emetic*** for narcotic poisoning, three or four grains in water every few minutes until vomiting occurs. Also suitable for acute phosphorus poisoning.

Locally in eye affections (trachoma) as stimulant, and for gleet.

Membranous colitis in children has been treated by injection of solution of 4 grains to the ounce with a little opium added.

In dry skin affections, and in tubercular tendencies, $\frac{1}{10}$ grain doses thrice daily, appear to act like arsenic, and are better tolerated.

In pyorrhœa alveolaris the gums are 'packed' with copper sulphate, and the patient directed to swab the gum with saturated solution of tannin in Eau de Cologne; the tartar is frequently removed.—Smale and Colyer.

Erosion in chronic endometritis has been treated by scarification and bathing with 7% copper sulphate solution.

Actinomycosis and blastomycosis have been treated by internal administration and irrigation with 1% solution. In syphilis, treatment with copper sulphate and potassium iodide may prove useful.

ACTINOMYCOSIS. Treated by injection of 1% Copper Sulphate Solution every few days until softening of the infiltration occurs. For small lesions a few Cc. If extensive, the first injections are given under anæsthetic. Abscesses are opened and scraped and 40 to 100 Cc. of ¼ to ½% injected. Destruction of the fungus claimed.—B.M.J.E. ii./22,42.

TRACHOMA well treated with subconjunctival injections of a 1% solution Copper Sulphate with 4% Procain.—Per Jl. A.M.A. ii./25,1923.

CANCER OF THE UTERUS.—After curetting, Copper Sulphate 10% solution used as paint, and when the ulcer becomes callous a series of injections of Colloidal Copper. Then Radium Radiation.—S. Forsdike, B.M.J. ii./25,839.

FISTULAS, both tuberculous and osteomyelitic, well treated with injections of 2 to 3 Cc. 10% solution.—Jl.A.M.A. ii./26,714.

Ionisation of copper, *vide* Iontophoresis, *Vol. II.*

Guttæ Cupri Sulphatis, R.O.H. 1 or 2 grains to the ounce. Suitable as a lotion for gleet. For styes epilate the lashes affected and use 1 in 100 lotion ten to thirty times a day. The lashes grow again.

Copper Points in holders, are useful for eye and intra-uterine medication.

Alibour Water.

Copper Sulphate 2½ drachms, Zinc Sulphate 9 drachms, Camphor 1 drachm, Powdered Saffron ½ drachm, Water 40 ounces.

This formula is approximately equivalent to *Eau d' Alibour Forte* of FR. CX. Nouv. Supp., '26, and with *Syn.* **Aqua Cuprozincica (Eau Cuprozincique)**, P. Belg. IV. *It must be diluted for use* with five or six times its volume of water, as a wet dressing in eczema.

Eau d'Alibour of the St. Louis Hospital, Paris.—Copper Sulphate 4 grains, Zinc Sulphate 6 grains, Camphor Water to 1 ounce. *Sycosis barbæ* well treated. At first apply at night only and a Calamine Lotion during the day.—J. T. Ingram, B.M.J. ii./29,620; P.J. ii./29, 397.

Ammonio-Cupri Sulphas. *Syn.* CUPRAMMONIUM SULPHATE, $CuSO_4.4NH_3.H_2O=245{\cdot}778$.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**), with Laudanum after meals.

Blue crystals soluble in water. Used in nervous affections. Lethal dose stated to be equivalent to 0·05 Gm. of Copper per kilo weight. Has been tried in cancer.

Cupri Chloridum, Cupric Chloride $CuCl_2+2H_2O=170{\cdot}516$.

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). Use similar to Copper Sulphate. Greenish very deliquescent crystals.

Lapis Divinus. Cuprum Aluminatum P.G. VI.

Potash Alum powdered 16 are mixed with powdered Copper Sulphate 16 and Potassium Nitrate 16 and melted with moderate heat in a porcelain dish. Camphor 1 and Potash Alum 1 are then added and the mass moulded or poured on to a plate to set.

P. Jap. adds Camphor 1 to 10, each of the other ingredients previously fused.

'Brass Paste.' Formed by combining Basic Copper Sulphate 86 with Basic Zinc Sulphate 14.

TUBERCULOSIS, CUTANEOUS and other forms. Application to the conjunctiva of the everted eyelid resulted in the removal of all tuberculous tissue in a case of 20 years' duration.

A fluid preparation "BRASS OIL" or "BRO" applied on gauze also used. Further, PICRIC BRASS PASTE containing 1% of Picric Acid found more penetrating.—H. A. Ellis, L. i./19,415.

Copper Alanine, *Syn.* **Copper Amino-propionate** $(CH_3.NH_2.CH.COO)_2$ Cu=239·796. *B. typhosus* and colon organisms are less resistant than *B. tuberculosis* to Copper salts. As Copper salts have a low toxic value in man especially when given *per os*, inorganic salts of Copper might be more widely used as bactericides. They exhibit a specially high toxicity toward protozoa and might possibly be useful in combating dysentery.

Copper Alanine is soluble in blood serum—a matter of importance. It does not precipitate egg white, milk or solutions of caseinogen. *Dose* of 0·00013 Gm. produced no effect in mice. 3 Cc. of 1 in 300 solution tolerated by rabbits. 2 Cc. of this strength (commencing with 1 Cc.) have been given in inoperable cancer of the breast, without local or general inconvenience.

Various low animal organisms were experimented on. *Haematococcus* which lies on the border between animal and vegetable kingdoms, lethal effect was seen in 20 minutes with solution of strength 1 in 50,000 and 1 in 100,000 Copper Alanine. *Paramœcium* was killed with 1 in 100,000 in 13 minutes. Strong effects also observed on amœbæ.—J. A. Shaw-Mackenzie, Med. Press, July 19, 1916. See also Proc. Phys. Soc., Jany. 27, 1917, Jl. Physiology, Vol. LI. and B.M.J. i./20,104,174.

Copper Sodium Tartrate.

A blue crystalline powder containing 15·75% metallic Copper. It has the advantage of being soluble in water to the extent of about 1 in 2. Suggested in protozoal diseases.—W. H. M., 1923.

SYPHILIS. A combination of **Copper and Sodium Thiosulphate (Cu-Devenan)** of value in syphilis. Spiricidal action considerable, with clearing up of rash and gummata, but effect on Wassermann reaction very slight. Well tolerated.—B.M.J.E. i./29,102.

℗ **Cuprocyan.**

A double Cyanide of Copper and Potassium, soluble in water and Alcohol. Contains 22·26% Copper. Can be injected intravenously, hypodermically or intramuscularly. The compound is administered in 2% solution. Hypodermically or intramuscularly 2 Cc. every other day; intravenously beginning with 5 Cc., then 7½ Cc., and finally 10 Cc., at intervals of 7 days—intravenous injections well tolerated. Intramuscular injections may cause a general reaction. Treatment can be prolonged without inconvenience for many months, but should be suspended occasionally. Good results obtained in tuberculosis and leprosy.—Jl. Trop. Med., Dec. 1/24,316; L. ii./21,1018.

Copper salts in pulmonary tuberculosis. Improvement in some cases.—C. Riviere, B.M.J. i./26,773.

DECOCTA.

Decoctions of drugs are usually prepared 5% (unless otherwise stated) by boiling the drug in coarse powder with distilled water for 10 minutes and straining. If necessary a few drops of Chloroform will preserve fresh decoctions for a reasonable period of time. For various decocta consult index. *The strengths of decoctions of powerful substances should be specified by the physician.*

Decocta Concentrata are prepared commercially as a general rule '1 to 7.' They should contain at least 20% Alcohol—as a preservative. Fresh decoctions are preferable.

Ⓟ DIGITALIS FOLIA.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

Fr. Cx.—*Maximum single dose* 3 grains, *maximum during* 24 hours 15 grains approx.

The dried leaves of *Digitalis purpurea* (*Scrophulariaceæ*) or foxglove, collected from plants commencing to flower.

Powdered drug (leaf of the second year) to be used *entire*.—F.I.—(*B.P.*'14), P. Belg. IV. and Fr. Cx. adopted. Ph. Ned. V. specifies drying at 55 to 60° C.

P.G. VI. requires the leaf in coarse powder in sealed containers to have 'official prescribed activity determined by physiological assay—method and data to be supplied later.'

F.E. VIII. *Syn. Hoja de Digital*, collected in Spain (dried at 55–60°C.) and P. Belg. IV. have Assay Method based on the International Standard Digitalis.

P. Ital. V. specifies 'growing wild in Sardinia and Corsica and cultivated' and excludes *Borago officinalis*, *Symphitum officinale* and *Verbascum Thapsus* leaves and has a qualitative test for Digitoxin.

International Standard Digitalis Powder *and the Assay of Digitalis and its preparations both chemically and physiologically* ***is*** *fully dealt with in Vol. II. q.v.*

A method of estimating the potency and probable therapeutic dosage by determination of the *minimum emetic dose in pigeons*. The efficiency of the method was corroborated on human subjects.—P. J. Hanzlik and A. B. Stockton, Jl. Ph. & Exp. Ther., April,'29,363-407 ; see also *ibid.* Sept.'29,67.

The International Conference on Biological Standards (July, 1923), fixed on a preparation of dried leaves as best ; it contains all the active principles. In 95% of cases a total dose of 1·5 Gm. per 100 lb., during some days, produced definite therapeutic effect.—B.M.J. i./24,715.

Digitalis leaves, we found, *should be collected from plants grown in a dry, sunny situation*—preferably after a spell of dry weather. These leaves are more active, weight for weight, than the larger leaves of plants cultivated in the shade. The effect of increased sunlight in content of active principles has been noted in other drugs, *e.g.*, Belladonna.—*See* "**Digitalis Assay**" by W. H. Martindale (H. K. Lewis). For **Digitalis Seeds** *see Vol. II.*

Digitalis Leaf Tablets are made containing ½ grain (**0·03 Gm.**) of the same strength as International Digitalis and equivalent to one third of an International Unit.

Dried leaf preferred. As vasomotor adjuvants, Papaverine and Quinine are good ; both have marked dilator action on peripheral circulation.—K. F. Wenckebach, B.M.J. i./30,181.

The biochemical action of Digitalis.—Max Cloetta, Jl. A.M.A. ii./29,1462.

Uses.—Digitalis is a valuable heart tonic and stimulant diuretic.

Digitalis has a narrowing influence upon the arteries. Acting on the vagus it pulls the reins of the heart. Acting on the heart muscle it is a most useful whip, at the same time providing it with food by improving the circulation. Slowing the heart, it makes it regular also. This slowing gives the heart an opportunity of resting, so secondarily improving contractility, conductivity and excitability. By primary action it increases its strength, regulates its rhythm by depressing excitability and conductivity. In large doses it may increase excitability causing extra-systoles, perhaps diminish con-

tractility and by causing long pauses do harm to the circulation. All these influences vary according to dose, form in which it is given and the conditions of the heart. It may be tried with success in every case where the condition of the heart is the cause of a bad circulation or troublesome symptoms. In doubtful cases give small doses. It should be given a fair trial in every case—especially in the form of powdered leaves.

The amount of the drug requisite to produce the first physiological effect is noted, and the quantity that maintains the heart in the condition best fitted to carry on the circulation efficiently. It may be that a given amount slows the pulse from 100 to 60 beats per minute, and coincident with the slowing there is improvement in patient's condition. If pushed further there may be still further slowing, but there may be untoward effects—thumping of the heart breathlessness, etc.,—the dose is gradually reduced to a point to maintain the greatest comfort.—J. Mackenzie, B.M.J. ii./10,1606

H. H. Turnbull reported that giving 15 minims 4 times daily it was found that the average quantity taken before symptoms were produced was about 6 drachms. If rapid action was desired, large doses, up to 2 drachms of Tincture *per diem*, were given and with this sickness (sign of full dose) and beneficial cardiac effects can be produced in 36 to 48 hours. If only 1 drachm *per diem* be given, a period of 4 to 8 days is usually required to produce satisfactory result. No danger in pushing the drug if type of case is taken into consideration and result watched. In most cases the nausea was the limit sign and the only cases likely to show bad effects are those with damage to auriculo-ventricular bundle in whom heart-block may result. Raised blood pressure is no contraindication to the use of Digitalis, and is often due to some secondary effect of the heart failure.

THE CHOICE OF A DIURETIC.—Digitalis when given in suitable cases is a safe and efficient promoter of diuresis, but the kidneys must be capable of responding to its action which is by causing contraction of peripheral blood vessels—those of the kidney excepted—and increasing the force of the cardiac systole. It therefore raises blood pressure and forces more blood through the kidneys. In renal disease, however, the blood pressure is often raised already, and to raise it still further is to force upon diseased organs, which are already greatly overtasked, an amount of additional work, which, in their crippled state, they cannot perform. Other drugs belonging to this group are Strophanthus, Convallaria, Strychnine and Squill. Digitalis, being a cumulative drug, if continued too long without a pause, when used as a diuretic, even in moderate dose, may begin to produce signs of depression.—Eustace Smith, B.M.J. i./11,289, *et seq.*

The Effects of Digitalis.

Digitalis is unique in Medicine. There is hardly any other condition in which by continuous drug treatment alone a patient may be helped from complete inactivity to a useful and even active life for many years.—M. Campbell, Pr. Jan.'31,38.

Considerable delay occurs before Digitalis (and Colchicum) produce their effect even after absorption. It is not perhaps until several hours after introduction of the first dose that the patient is under the maximum influence. This is the reason why the treatment of pneumonia by cardiac tonics is commenced early to assist heart's action in event of it beginning to fail.—P.J. ii./11,15.

AURICULAR FIBRILLATION responded well unless pyrexia was present or unless there were marked fibrotic changes in the heart muscle. Cases without auricular fibrillation rarely showed marked improvement. 1 to drachm doses of the Tincture given daily until some definite effect obtained

Contrary to general belief, Digitalis does not raise blood pressure by constricting the peripheral vessels, and there is no risk in giving it to those suffering from degeneration of the blood-vessel walls. There is no difference between Digitalis, Squill and Strophanthus in the action on the heart, but the last two showed variation in regard to dose. Aconite had no effect upon the pulse rate.—F. W. Price, B.M.J. i./13,484, and earlier refs.

Digitalis in non-valvular heart disease. Digitalis is more certain than Strophanthus or Squills. Tinctures should be dispensed *as such* or only with alcoholic preparations.

The action of Digitalis is slow—rarely is any distinct change seen before four days. For more rapid effect Strophanthin intravenously $\frac{1}{250}$ to $\frac{1}{100}$ grain.—Cushny, B.M.J. ii./12,685 *et seq.*

EMETIC ACTION of Digitalis. It is impossible to regard Digitalis as emetic by irritation of the gastric mucosa—vomiting caused by stimulation of the "vomiting centre" in the medulla. If clinical experience should confirm this, vomiting after Digitalis will be regarded not so much as a check to the further use of Digitalis, but as an indication that the drug has been absorbed. —L. ii./13,1014.

Withering (1775) advocated the use of Digitalis as having a power over the motion of the heart. It was to be continued 'until it either acts on the kidneys, the stomach, the pulse or the bowels.' Atropine largely fulfils the want of a remedy (absent at that time) 'to counteract the effects of Digitalis if inadvertently the doses be presented too largely, too rapidly or urged to too great a length.' Digitalis cannot influence heart-rate in presence of febrile stimulation. It has found its greatest successes in uncomplicated mitral regurgitation associated with the general evidence of cardiac failure.

Further Reports on Use of Digitalis.

James Mackenzie in the issue of 'Heart,' dated Aug. 31, 1911, recorded results in 40 cases. Of these 20 had mitral stenosis, one was described as 'mitral,' 10 as 'mitral and aortic' disease, two as 'aortic' and the rest a group containing cases of paroxysmal tachycardia, bradycardia and emphysema. Ten of the mitral stenotic cases responded well to the drug, 8 did not. Of the mitral and aortic cases only one responded; neither of the two 'aortic' cases was notably affected, while in the miscellaneous group 4 improved and 3 did not. The general conclusion was that 'cases of ***auricular fibrillation are more readily and markedly affected than cases with normal rhythm,***'—*i.e.*, the form of irregular heart usually associated with mitral disease, especially in younger subjects who have suffered from rheumatic fever, and in whom the cardiac muscle is fairly sound, respond most easily to the drug. It is thought that the diuretic effects of Digitalis may be observed without any perceptible change in the heart. The Tincture was mostly used in dose of 15 or 20 minims three or four times a day 'until some definite reaction was obtained.' Aconite, long regarded as a retardant of cardiac action was quite inert in medicinal doses. Strophanthus though acting well in regulating irregular hearts was never seen to succeed when Digitalis had failed. Atropine was potent in accelerating some hearts retarded by the action of Digitalis.—L. ii./11,956; see also B.M.J. ii./11,869.

AURICULAR FIBRILLATION IN PREGNANCY.—Patient had an intolerance to Digitalis. Vomiting was caused by it, but she became more tolerant to it, and on one occasion took 11 drachms before feeling sick. On several occasions when the heart was beginning to fail it could be definitely ascertained that the amount of urine was decreasing. Under Digitalis the amount increased—sometimes to as much as 90 ounces. In this case the effect of Digitalis was to slow the pulse, improve the pulmonary condition and sometimes to promote diuresis. Digitalis was given just before the child was born—which occurred after the full effect of the drug was established.—C. H. Miller, L. ii./12,1218.

AORTIC INCOMPETENCE.—Digitalis is not advised. Success with Nitroglycerin. G. Evans records, however, improvement from it, with increase in urine elimination.—L. ii./16,249.

Digitalis and Atropine. Action on the peripheral circulation.—I. Harris, L. i./21,1072.

Digitalis requires ***at least 6 hours for complete absorption*** *after oral administration* and is destroyed or eliminated very slowly, so that if repeated doses are given at about six-hourly intervals it may be stopped at first sign of intoxication when there is little of it to be further absorbed

and no chance of severe toxic effect. Thus the maximum benefit is obtained some days after the commencement. Digitalis was given by the ***'Rapid Method'*** with doses of 1½ drachms, 1 drachm and ½ drachm of the tincture at intervals of 6 hours. In AURICULAR FIBRILLATION with rapid ventricular rates and urgent symptoms, prompt slowing and clinical improvement resulted. Cases with normal rhythm are not suited for the method.—F. R. Fraser, L. ii./22,703.

Professor Fraser's method of producing rapid effect by oral use of digitalis was described as far back as 1875 by G. W. Balfour.—Harrington Sainsbury, L. ii./22,885.

AURICULAR FLUTTER.—By pushing treatment a flutter can be converted into fibrillation, which may be replaced by normal rhythm on discontinuing drug. Flutter may persist for years, but when ventricular rate is controlled by Digitalis little additional burden appears to be placed on the heart.—J. C. Bramwell, L. i./25,1044.

Remarkable uniformity in reaction of cases of auricular fibrillation treated with Digitalis.—A. R. Gilchrist and D. M. Lyon, Jl. Ph. & Exp. Ther., Aug., '27,319.

54 cases of auricular fibrillation treated with 0·1 Cc. of Tincture per lb weight, with Sodium Bicarbonate, Aromatic Spirits of Ammonia, and Chloroform Water to 3 ounces. The average dose was 13 Cc., and the average pulse before use was 140 and 8 hours after was 91. Toxic effects occurred once and vomiting twice, and the average duration of good effect was 6 days so that small doses were needed at the end of a week. The method is a measure of urgency ***only.***—G. J. Langley, B.M.J. i./27,1043,1162.

BRIGHT'S DISEASE.—In certain cases when dyspnœa is present the symptoms may be combated with Digitalis, or Ether, by stimulants, and by expectorants.—Tirard, Clin. Jl., April 5/11,401.

CARDIAC FAILURE.—Digitalis must be pushed to full legitimate limit. When it is consequent on fibrillation, digitalis gives its dramatic results. Strychnine, alcohol and camphor doubtful stimulants. There are very few specifics. A general account of the subject which will repay further study.—J. Hay, B.M.J. ii./22,899.

CONGESTIVE HEART FAILURE. Rest and Digitalis the outstanding method of treatment. *Digitalisation.*—Calculate dose in minims by multiplying body weight in pounds by 2½, *i.e.*, a 10-stone patient requires 350 minims. (Initially it is best to give 2/3 of this dose.) In urgent cases if no Strophanthus or Digitalis has been given previously, safest to give half the dose at once, ¼ the dose after 6 hours, 1/8 after a further 6 hours, and a further 1/8 after 6 hours. Often not sufficient urgency to warrant more than 90 minim doses three or four times daily.—Maurice Campbell, Pr. Jan.'31,32.

OVERWORK AND WEAKNESS.—Two minims of Tincture thrice daily for a lengthy period with intermissions, as advised in Balfour's 'Senile Heart.'—'D.M.' in M.P.C., Oct. 26, 1927.

A new Digitalis body with true Digitalis action, capable of being eliminated from a cat within a few hours of its intravenous injection.—Jl. A.M.A. 1923, 1072, per P.J. i./23,456.

PNEUMONIA. The Infusion of Digitalis helps the heart to resist depressant action which the pneumonia toxin has. 1 drachm of the infusion every 4 hours, increasing to ½ ounce every 4 hours, or 3 hours, night and day. Begin about second or third day.—E. M. Brockbank, B.M.J. i./30,974.

RHEUMATIC HEART of children treated.—G. A. Sutherland, B.M.J. ii./19,50.

Cumulative Action.—In the case of the *Tincture* this may be ignored, especially as nowadays a large initial dose is given, but more than 2 maximum doses should not be given during 24 hours.

The late Prof. Cushny held that *any Digitalis preparation which does not produce cumulative effect or nausea must either be inert or else so weak as to be valueless.*—B.M.J. i./25,412.

Irritant effect to the renal epithelium may be caused by Digitalis, as the appearance of blood and albumen in the urine of animals after large doses shows.—Cushny, L. i./17,442.

VISUAL DISTURBANCE due to Digitalis intoxication following excessive dosage. Visual disorders from use of Digitalis more common than supposed.—H. B. Sprague and co-workers, Jl. A.M.A. ii./25,719.

Antidotes.—After emetics give gallic or tannic acid, camphor, nitro-glycerin, coffee or tea, also ether or alcohol. Aconitine $\frac{1}{120}$ grain hypodermically to be repeated in $\frac{1}{2}$ hour if heart action improves. Atropine 1/200 to 1/100 grain hypodermically is advised instead, by some. Patient should lie down until recovery.

Incompatible with preparations of cinchona and with lead acetate, also with iron salts (but the blackening is preventable by citric acid) and with iodine and potassium iodide.

Ⓟ**Extractum Digitalis.** Fr. Cx. Dried leaves extracted with 70% Alcohol, evaporated to soft extract.

Ⓟ **Infusum Digitalis** (*B.P.* '14). About 1 in 143.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

This is an active preparation. In use it may well be combined with some vasodilator.

U.S. X.—Digitalis 15, Boiling Water 700; infuse one hour, filter and add Cinnamon Water 150 and Alcohol 100, finally cold Water *q.s.* to 1,000.

P. Ital. V. and F.E. VIII. have 1% in boiling water. Length of infusion not defined. P. Belg. IV. states 'prescribed quantities' of leaves in water at 70° C.

Ⓟ**Acetum Digitalis, Ph. Ned. IV.,** Digitalis Leaves 1, Dilute Acetic Acid (6%) 9, Alcohol (90%) 1. Macerate 5 days.

Ⓟ **Liquor Digitalis ad usum internum. Ph. Ned. V.** *Syn.* Digisol.

Dose.—Maximum single 3 Cc. Maximum daily 10 Cc.

Preparation.—This is similar to that of the solution for injection following, except that, after the evaporation of the Chloroform, the volume of water used to extract the residue is 88% of that of the Chloroform. Finally to every 88 parts of this solution are added 12 parts of 96% Alcohol.

Ⓟ**Liquor Digitalis ad Injectionem,** Ph. Ned. V. *Syn.* Digisol for injection.

Dose.—5 Cc. maximum single and *pro die.*

Preparation.—Macerate one part of powdered Digitalis leaves with 8 parts of water during 48 hours at a temperature not exceeding 15°, strain and filter. Shake the filtrate with an equal volume of Chloroform during 48 hours, avoiding emulsification. Reserve the Chloroform solution and evaporate a measured volume of the aqueous layer on the water bath to a thick extract. To this add sufficient exsiccated Sodium Sulphate to form a dry powder. Shake this during 24 hours with a volume of the Chloroformic extract equal to that of the evaporated aqueous solution and filter. Measure the volume of the Chloroform and distil off. Treat the residue with water equal in volume to that of the Chloroform, using small quantities at a time; dissolve 0·8% of sterile Sodium Chloride in the solution and filter. Sterilise by heating on 3 consecutive days for 1 hour at 70—80° C. *Keep in a cool place away from light.*

This solution and also the Digitalis leaves are tested biologically. The fatal dose of this liquor per kilo for a cat is 2 Cc.

Pharmacology.—

A quantity of this Dutch Liquor made with leaf grown by the writer in 1927 was examined by the usual cat method.

The lethal dose was :—

1st cat	..	..	..	1·7 Cc. per kgm
2nd cat	..	..	..	2·1 Cc. ,, ,,
Average	..	..	..	1·9 Cc. ,, ,,

This agrees almost exactly with the figure stated in the Ph. Ned. V.

Ⓟ **Digitalone.** *Dose.*—Hypodermically 8 to 15 minims (**½ to 1 Cc.**). *Per os* 15 to 30 minims (**1 to 2 Cc.**) cautiously increased. Contains chloretone as preservative and 'anæsthetic.' Physiologically standardised.

Ⓟ **Tinctura Digitalis.** (*B.P.* '14.) 1 in 10 of 70% Alcohol=F.I. (as also F.E. VIII., P. Belg. IV. and P. Ital. V.). *B.P.* 1898 was 1 in 8 of 60% alcohol.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Frequently single doses of as much as 1½ drachms are given. Large single doses in many cases preferable to repeated small doses.

See Abstracts under Uses of Digitalis.

U.S. X. 1 in 10. The menstruum is Alcohol 4 and water 1.

Fr. Cx.=F.I. max. single dose, 25 minims; max. during 24 hours 90 minims approx.

In the **U.S.P. X. biological assay** the tincture, properly diluted, is injected into the ventral lymph sac of the frog, and should have a minimum systolic dose of not less than 0·0055 Cc., and not more than 0·0065 Cc., equivalent to $0{\cdot}46 \times 10^{-8}$ to $0{\cdot}54 \times 10^{-8}$ Gm. of Ouabain per Gm. body weight.

In preparing the tincture, the Digitalis is first percolated with Petroleum Benzine until a few drops leave no greasy stain. The Benzine is rejected, and after exposure of the drug to the air until odour of Benzine disappears, it is percolated with the dilute Alcohol (76%).

Physiologically Standardised Digitalis Tincture. *Dose.*—5 to 15 minims, is available in commerce of strength 0·75 Cc.=Minimum Lethal Dose per 100 Gm. of frog.

Deterioration of Preparations.—Physiological Experiments which we had specially conducted for us (1913) would indicate that there is only a slight falling off in strength in 12 months. Indeed, we were able to demonstrate that a tincture ***12 Years*** old was quite up to the standard—this was confirmed by physiological test.—*cf.* L. i./13,77. *We deal with this matter more fully in Vol. II.*

An Interesting Investigation.—Some years ago, as mentioned under Tincturæ, we proved experimentally that Tinctures of various drugs of very closely equal strength can be made either by a few hours maceration or by lengthy maceration and percolation. We were more especially concerned with Alkaloidal Drugs.

Recently (in 1927) we had comparisons made for us of the following Digitalis Tinctures :—

(A) Made by simply macerating and occasional shaking for *six hours* and then filtering off, using 1927 crop of leaf of our own growing.

(B) Made by the *B.P.* '14 process—the percolation taking three days—using the same leaf as in (A).

The report showed that in cats

(A) Had average M.L.D. 15·2 Cc. per kilo.
(B) ,, ,, ,, 14·7 Cc. ,, ,,

A Tincture made from International Standardised Digitalis under similar conditions had M.L.D. 15·96 Cc. per kilo.

(A) was therefore 104 and (B) 108% of the activity of the Standard.

The results confirm that ***short maceration is practically as efficacious as the lengthy percolation process.*** In the case of Digitalis one might have doubted that this was so.

Incidentally, a third sample, (C), examined at the same time had 93% of the activity of the Standard. This Tincture was 2 years old.

It is the common practice to 'pass' a Tincture within 25% of Standard. The margin seems, to our mind, rather wide, in view of the proof that a first-class Tincture can be made by the simple process described.

Tartaric Acid 0·05—0·1% added to the Tincture is stated to be preservative.—Arch. Exp. & Path. Pharm. 24,102,17, per P.J. i./25,173.

Maceration for 24 hours with ½ ounce of hide powder to the pint is said to, detannate the tincture.

Relative value of Tincture and fresh infusion.—In an investigation comparing Alcoholic Tinctures and water-soluble glucosides from Digitalis, E. Berry found the latter gave the most desirable therapeutic effect. Details for preparing an aqueous solution of glucosides free from Digitoxin and Saponins.—P.J. ii./15,783.

There is *no difference between amounts of saponin bodies present in tincture and infusion* of Digitalis made from equal weights of the leaf, and therapeutic doses of Digitalis do *not contain enough saponins* to induce any undesired effects.—Weiss & Hatcher, Jl. Am. Ph. Assn., 6, 1921, abst. C. D. June 24/22, 809.

In tropical climates such as that of India, Tincture of Digitalis undergoes deterioration in a short time. Tinctures become darkish in colour on dilution and are evidently considerably weaker in therapeutic efficacy. ***Dosage used in India far too small.*** With tinctures of standard strength, doses of at least 20 to 30 minims three times a day should be given, increased for urgent cases to 45 to 60 minims, until the amount calculated by Eggleston's method is given.—R. N. Chopra, S. C. Bose and P. De, I.M.G., Mar. '25,97.

In cold countries the average quantity of Tincture of Digitalis required to cause toxic effects varies from 4 to 7 fluid drachms, but in Calcutta the smallest dose required was 9 drachms and the highest 29 drachms, while the average was well over 14 drachms. Due to loss of potency of Tincture and increased decomposition in the alimentary tract and liver. Toxic effects with B.P. Tincture in 15 m. doses thrice daily very rare in India. To obtain prompt results in grave cases 2 to 3 drachms per day for 5 days should be given. The stage of optimum benefit from Digitalis usually merges into the stage of minor intoxication from cumulation of the drug.—S. C. Bose, I.M.G., Apl., '25,154.

In AORTIC DISEASE, when compensation fails, bold doses, *e.g.*, 15 minims every four hours are given with safety.

Bronchial constriction following administration of Digitalis, relieved by Atropine.—B.M.J. i./24,715.

Flavoring.—Glyl Coriandri, Syl Lavandulæ; Syrupus Aurantii.

Digitalis in Cat Unit Tablets (Upsher Smith).

Each tablet is one standard Hatcher Cat Unit of Digitalis. Twenty-four tablets are stated to be adequate for complete digitalization of any case. *See also* **Digitalis Leaf Tablets—International Standard,** *antea.*

Ⓟ **Tinctura Digitalis Foliorum Recentum.**—*Martindale.*

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Prepared from fresh second year's leaves and chemico-physiologically standardised to normal (=M.L.D., 0·75 Cc. per 100 Gm. frog). Kobert and other authorities favour a preparation made by this method. In view of the poor keeping qualities of the leaf, unless properly stored, and the exceedingly complex composition of its active principles, the idea should be welcome.—*cf.* P.J. ii./13,437,573.

Ⓟ **Glycetract Digitalis.**—*Martindale.*

Dose.—1 to 2 minims. A potent preparation *vide* Glycetracta.

℗ **Pilula Digitalis Composita** (**Baillie's Pills**).—**St. G.H.**

Syn. **Guy's Pill, Addison's Pill.**

Dose.—1, as often as 3 times a day.

Mercurial Pill 2, Digitalis Leaves ½, Squill 1. In grains for one pill; in grammes for fifteen. Used in cardiac dropsy.

℗ **Pilula Hydrargyri et Digitalis Composita.** **St. Bart.'s H.**

Mercurial Pill 1 grain, Digitalis 1 grain, Squill 1 grain, Extract of Hyoscyamus 2 grains.

℞ ℙ1 **Pilula Von Niemeyer.**—*Dose.*—1 pill thrice daily.

Digitalis Powder ½ grain, Ipecacuanha ¼ grain, Opium Powder ¼ grain, Extract of Helenium ½ grain.

Used in combating the fever of phthisis. When the fever is of the periodical type, with pronounced exacerbations and chills, one grain of Quinine Sulphate is added to the above formula.—*Ex* Pres.

℗ **Vin de Digitale Composé.** *Syn.* Vin de l'Hotel-Dieu, Vin de Trousseau. Digitalis leaves 1, Squill 1½, Juniper Berries 15, Potassium Acetate 10, Alcohol 90% 20, White Wine 180—all by weight.

Digitalis Glucosides.

ℙ1 *Digitalin and all other poisonous constituents of Digitalis.*

Digitalis leaves and seeds contain several active crystalline and amorphous principles. We deal only with those actually known to be of use and which are available in commerce.

ℙ1 **Digitoxin** (P. Helv.). $C_{28}H_{16}O_{10}=542{\cdot}3648$. *Dose.*—$\frac{1}{250}$ to $\frac{1}{64}$ grain (**0·00025 to 0·001 Gm.**). *Caution.*—0·002 Gm. may be a fatal dose.

P. Belg. IV. and F. E. VIII, have formula $C_{34}H_{54}O_{11}$, P. Ital V. $C_{44}H_{70}O_{14}$.

Manufacture.—Grind leaves to fine powder, exhaust with water, and after drying again, extract with 50% Alcohol. Precipitate liquor with Liquor Plumbi Subacetatis, collect liquor, drive off most of the alcohol, extract residue several times with Ether, treat with water, and leave to crystallise. Re-crystallise from 85% Spirit, using charcoal to decolourise.—E. Schmidt.

The content in the freshly harvested leaves is stated to be 0·25%.

This is a potent Glucoside stated to have uniform therapeutic activity. ***Soluble*** about 1 in 80 of absolute Alcohol, and soluble in Chloroform. Sparingly soluble in Alcohol 90%; very soluble in more dilute Alcohol.

In the pure condition it is stated to be insoluble in water. There is, however, physiological and chemical evidence that it is *soluble in the presence of the other glucosides* (*cf.*, Am. Jl. Ph., May, 1913).

Solutions may be made containing $\frac{1}{64}$ grain (**0·001 Gm.**) Digitoxin in 15 minims (**1 Cc.**) of **Petit's Liquor.** This quantity will approximate 40 drops, which may be considered a maximum dose. Suitable either *per os* or as an enema. May also be given in **Syrup,** Digitoxin 0·1, Alcohol (90%) 200, Distilled Water 750, Syrup to 2,500. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

℗ **Tablets** and ℗ **Granules** (Pills) of Digitoxin are prepared containing $\frac{1}{250}$ grain (¼ milligramme).

The so-called '**Digitaline Pure Amorphe**' (Homolle), Fr. Cx. 1884. *Syn.* '**Chloroformic Digitalin,**' consists principally of a Glucoside resembling Digitoxin, and the **Digitaline Crystallisée** Fr. Cx., consists almost entirely of it.

Caution.—When Digitalin is ordered (with the relative *bold dose*) **Digitalinum Pulv. Purum** (*postea*) should be given.

℞ ✱**Nativelle's Crystalline Digitalin,** is probably identical with Digitoxin.

℗ ✱**Digitalin Granules, Nativelle** $\frac{1}{240}$ grain, also $\frac{1}{600}$ grain. (✱Nativelle is T.M. 300453).

Large doses are given to diminish the period of systole and to effect diuresis. Small doses for sedative effect, *e.g.*, in palpitation and to relieve dyspnœa associated with mitral stenosis—one Granule every three or four days. Suspend administration periodically if necessary.

℗ ✱**Nativelle's Digitalin Solution.** For intramuscular injection into the pectoral or other region free from œdema.

Dose.—1 Cc. containing $\frac{1}{240}$ grain (**0·00025 Gm.**). An oily stable solution. Ampoules are prepared.

In cases of asystole amenable to Digitalin an injection is made for four consecutive days. In milder cases of hyposystole two days following, 1 Cc. being injected on each occasion. In acute cases with implication of the myocardium and threatening cardiac failure, a single injection usually suffices to restore the strength of the contraction. May be repeated once or twice. When the case is grave an injection of Caffeine Sodio-Salicylate should be given two hours before the Digitalin. In pneumonia, according to circumstances, from one to four doses.

Indications for hypodermic use—

The hypodermic method alone is admissible (1) in grave cases where cardiac failure is imminent and immediate and certain action is required, because in such cases gastro-intestinal absorption is slow and uncertain. (2) In cases in which it is desirable to safeguard the stomach and to avoid setting up gastric intolerance or embarrassment of cardiac action by a dilated stomach, the hypodermic method must be used, *e.g.*, in typhoid with failing heart, where diuresis is essential; in vomiting in arterio-sclerotics, where the stomach becomes distended on the slightest irritation.

The formula C_{44} $H_{70}O_{14}$ is assigned to Digitoxin. **Gitalin** is pharmacologically similar.—Arch. Exp. Path. Pharm. 1926,261.

Koppe took 1 mgr. of Digitoxin *per os* without any certain toxic effect, but a dose of 2 mgr., taken four days later, nearly produced a fatal result. —Prof. Cushny, B.M.J. i./25,412.

℞ **Digitalinum Pulverisatum Purum.**

Dose.—$\frac{1}{100}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) three or four times daily in pill, tablets, or subcutaneously. Consists of a mixture of Digitalin (Kiliani), Amorphous Digitonin and Digitalein.—M.Am. *cf.* Driver & Trease, P.J. i./27,624). Non-cumulative, but caution —powerful drug. It is a yellowish-white powder ***Soluble*** in water and alcohol, nearly insoluble in chloroform. *Well adapted for hypodermic injection.*

We repeat: When '**Digitalin**' *is ordered either for internal or hypodermic use this substance should be supplied.*

℗ **Hypodermic Tablets** of Digitalin, $\frac{1}{100}$ grain (**0·0065 Gm.**).

℗ **Sterules (Hypodermic) Digitalin** $\frac{1}{100}$ grain, also ℗ with **Strychnine Hydrochloride** $\frac{1}{1000}$ grain as heart stimulants.

Ⓟ Tabellæ Digitalini et Nitroglycerini.

Digitalin $\frac{1}{100}$ grain (**0·006 Gm.**) with Nitroglycerin $\frac{1}{1000}$ grain (**0·0006 Gm.**).

Useful in aortic disease. Where vascular tension is high, the addition of Nitroglycerin prevents increase of peripheral resistance and thus robs the Digitalis of the influence on the arterioles, 'on account of which its administration is supposed to be contra-indicated.'

Ⓟ ✱**Digalen** (T.M. 265442) (Cloetta's).

Dose.—5 to 15 minims.

A proprietary solution said to contain in each 1 Cc. (17 minims) 0·3 mgm. of an amorphous glucoside of same empirical formula as Digitoxin. For œdema of cardiac debility.

15 minims correspond to 2 grains of Digitalis Leaves or 18 minims of Tincture.—B.M.J. ii./09,1100.

Ⓟ **Hypodermic Tablets,** 1 dissolved in 15 minims, makes a solution for intramuscular use of the same strength as above.

Intravenous use void of pain and does not hæmolyse blood corpuscles.—B.M.J. i./12,60. See also W. L. Symes, L. ii./11,1349.

The emergency intravenous dose of Digalen, for patients who have not previously received Digitalis, is 1 minim per lb. weight, *i.e.*, one-half the full therapeutic dose. If necessary give another dose of ¼ minim per lb. weight and repeat at 2-hourly intervals to a total of not more than 4 injections until improvement or sign of toxic action, then revert to oral use.—H. E. B. Pardee Jl. A.M.A. ii./28,147.

It has probably increased diffusibility on account of its increased solubility—to which is due, it is said, absence of digestive disturbance when given *per os.*—Pharmacol, p. 16.

Ⓟ **Digistrophan Tablets** are made, each = 0·1 Gm. Digitalis with in addition 0·05 Gm. Strophanthus.

Digitalis Lanata a potent source of glucosides, stated to be nearly 4 times as potent as *D. purpurea* home grown.—F. Wokes, P.J. ii./29,16.

Digoxin.—A new glucoside isolated from *D. Lanata*, $C_{41}H_{64}O_{14}$ Its pharmacological activity is ¼ that of Ouabain.—S. Smith, J.C.S., Mar., '30 508.

ELIXIRS.

These are generally composed of a weak-flavoured syrup, with a fair proportion of alcohol. For list consult Index.

Elixir Aromaticum, Aromatic Elixir, U.S. X.

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

Compound Spirit of Orange, U.S. 12, Alcohol to 250. Add gradually, with constant agitation, Syrup 375, and then Distilled Water 375. Mix with the liquid Purified Talc 30, and filter until clear; then add a mixture of Alcohol 1 and Distilled Water 3 *q.s.* to 1,000 (*Spiritus Aurantii Compositus*, U.S.—Oil of Sweet Orange Peel 40, Oil of Lemon 10, Oil of Coriander 4, Oil of Anise 1, Alcohol to 200).

The following saves time:—Mix the Compound Spirit of Orange with Talcum (Magnesium Carbonate better), add to this in a mortar gradually the water and alcohol previously mixed, transfer to a wetted filter and when a 'through' make up volume to 818 Cc., then add sugar 318 and shake or percolate the sugar with the filtrate.

Elixir Simplex, B.P.C., 1894 :—

Oil of Bitter Orange 30 minims, Rectified Spirit 6 ounces. Dissolve and add Cinnamon Water 7 ounces, Syrup 7 ounces. Filter through paper sprinkled with Kaolin until bright.

Dose.—20 minims to 1 drachm. This quantity may be added to the ounce of a liquid medicine.

That of B.P.C. 1923 is about ¼ the alcohol strength of above.

N.B.—Alcohol Soluble drugs quite compatible with the original formula may be insoluble in the current one.

Elixir Aurantii Amari. *Syn.* ELIXIR OF CURACAO.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

Oil of Bitter Orange 4, Tincture of Bitter Orange Peel 20, Alcohol 300, Strong Orange Flower Water 20, Syrup 400, Distilled Water (*s.a.*) to 1,000. Filter through Kieselguhr.

Elixir Rhei, B.P.C.—*Syn.* LIQUOR RHEI DULCIS.

Dose.—1 to 3 drachms.

Dissolve Anethol 0·05 in Alcohol 2·5 and add to Liquid Extract of Rhubarb 25, Syrup 22·5, Glycerin 15 and Water to 100 previously mixed ; filter if necessary.

Elixir Rubrum.

Dose.—20 minims to 1 drachm (**1·2 to 4 Cc.**).

Solution of Carmine (*q.v.*) 1, Simple Elixir (B.P.C. 1894) 64. Gives an agreeable flavour and colour to liquid medicine, but is not compatible with acids.

Elixir Ficorum (*Martindale*).—*Syn.* SYRUPUS FICORUM.

Elixir or Syrup of Figs.

Dose.—1 to 4 drachms at bedtime or early morning.

Macerate Senna 16 ounces in cold water *q.s.* to cover twice and decant. In the first liquor heated to boiling, macerate figs cut small 32 ounces. Strain off the liquor as much as possible, and macerate the marc in the second senna liquor previously heated to boiling point. Strain off this second maceration liquor, and evaporate the two combined to 35 ounces. Dissolve in this (hot) sugar 70 ounces. Add, mixed, cinnamon oil 10 minims, oil of cloves 10 minims, chloroform 25 minims in alcohol 90% 150 minims. Make the product up to 80 ounces with water.

ENEMATA.

Substances administered *per rectum* are absorbed approximately at the same rate as when administered *per os*—exceptions are Strychnine and Quinine (slower).

Rectal Feeding.

It is said that under the most favourable conditions it is only possible to supply by means of enemata about one-quarter of the food material required to maintain nutritive equilibrium. **Protein,** even when peptonised, is so badly absorbed as to be of little value (see also **Nutrient Enemata** *infra*). The same is generally true of **Fat,** even when emulsified, but different individuals vary widely in their power of fat-absorption. **Sugar** is well absorbed, but allowance must be made for the destructive activity of bacteria breaking up sugar, so that some at least is lost for purposes of nutrition. **Starch** 50 Gm. *pro die* can be digested. **Water and Salts** are well absorbed. It is said that five or six ounces, gradually increasing by one ounce at a time to ten ounces, of warm water given every four hours will sustain a patient, with supplementary nourishment, for ten days to three weeks. **Alcohol** suitably diluted is well absorbed. **Stimulant Enema.** 1 to 2 ounces of Brandy with warm water, *e.g.*, 1 to 3 ounces. By the most careful adjustment it is difficult to raise fat absorption above 10 Gm. in twenty-four hours or that of

protein above 20 Gm. During a course of rectal feeding the bowels should be washed out once daily with an enema of tepid water before the nutrient injections are given. This cleans the bowel and washes away poisonous products of albuminous decomposition.

The injection of Nutrient Enemata should be given as slowly as possible. The best posture is with the patient on his left side, with his hips raised on a pillow. To avoid thirst not less than 2 pints of fluid should be allowed in the twenty-four hours to an average adult patient.

Of **Dextrose** (in 10% solution), 99% is absorbed. 6% is isotonic with blood and would be found more convenient and less irritating. 15 ounces or more of this Solution four times a day is well retained by an adult if the rectum is well washed out once a day with Saline Solution. The 100 Gm. or more of Dextrose thus given daily diminishes Nitrogenous waste.—N. Mutch and J. H. Ryffel.

Enema Nutriens. L. H. *Syn.* DEXTROSE NUTRIENT ENEMA

Dose.—5 ounces every 4 hours, or if patient can retain it 10 ounces every 8 hours.

To 1½ pints of milk boiled and cooled add ½ ounce of a reliable Pancreatic Fluid or 4 Pancreatic Tablets. Maintain at body temperature 24 hours, add 1½ ounces of Pure Dextrose. Dextrose has been proved to be absorbed by the rectum, hence an important means of feeding patients who cannot take food by the mouth. The Amino-Acids separated by pancreatising the milk are also absorbed.—A. Rendle Short and H. W. Bywaters.

Glucose (St. M's. H.) 1 ounce with Normal Saline 1 pint.

The bowel is incapable of absorbing anything other than water and Glucose. 'Nutrient enemas,' *e.g.*, milk, beef tea, etc., valueless.—A. Abrahams, Pr. May, '32,527.

Enemata to act merely in the rectum and to be retained, may be given in volume of 5 ounces, but for the large intestine and lavage purposes employ one to two pints or more.

Glycerin Enemata for laxative effect rarely exceed ½ ounce.

Enema Opii is Tincture of Opium *q.s.* (*e.g.*, 5 to 20 minims) as desired by the physician, with Mucilage of Starch to 1 or 2 ounces, mixed with gruel 5 ounces.

Anæsthesia.—Ether and Olive Oil, see 'Oil-Ether Anæsthesia.'

Aperient Enemata (1 to 6 pints) are made with Soft Soap, with warm water *q.s.*, *e.g.*, **Enema Simplex, L.H., St. M's. H.**, 1 ounce to the pint, or with gruel. Marshall gives the following:—

Evacuant Enemata.

Enema of Sodium Chloride 2 to 5%. Enemata of Chamomile Infusion and other vetegable infusions; Enemata of Fixed Oils (½ to 1 pint of Olive Oil) for inflammation of rectum associated with hardened fæcal masses.

Enemata for action on rectal mucous membrane contain—

Alum 0·5%.
Asafetida 5% of Tincture in Starch Mucilage.
Boric Acid (Saturated Solution).
Bismuth Carbonate or Subnitrate 1%.
Ferric Chloride (Strong Liquor) 2%.
Infusion of Garlic and similar anti-spasmodic substances.
Lead Acetate 1%.
Ⓟ Mercuric Chloride 0·01 to 0·05%.
Mucilage 25%.
Oil of Turpentine 0·5 to 1%.
Ⓟ Ⓟ1 Opium (or its alkaloids), a maximum dose (Ⓟ if containing less than 0·2% morphine). L.H. has Tincture 10 to 60 minims, with Starch Enema to 4 ounces, St. M's. H. 10 minims with Starch Mucilage 2 ounces.
Salicylic Acid 0·3%.
Silver Nitrate 0·1%.
Tannin 1%.

Cf. also in text, Enema Magnesii Sulphatis (et Acida), Enema Naphthalini, Enema Olei Ricini and Enema Olei Terebinthinæ.

For ulceration of rectum Silver Nitrate 10 grains to the pint, also Salol Enemata 1 to 2 drachms in Turpentine, also Ferrous Sulphate and Copper Sulphate have been used.

Enema for thirst after operation (U.C.H.): 2 pints of hot water. **K.C.H., L.H., U.C.H., C.X., R.F.H., R.N.H., E., C.H.W., St. G. H., St. M.'s H., St. Th. H.** and **W.**, give formulæ for various Enemata.

All Enemata should be given at body temperature.

ℙ1 EPHEDRINA.

$C_{10}H_{15}ON = 165{\cdot}125$

$(C_6H_5.OH.CH.CH.CH_3.NH.CH_3)$

An alkaloid obtained from *Ephedra equisetina* (Bunge), *Ephedra sinica* (Stapf), and other species. It has generally been extracted from the Chinese drug Ma Huang (*Ephedra vulgaris* var. *Helvetica*-content about 1%), known 5,000 years ago and now sold in Peking drug shops in small brownish green sticks.

The alkaloidal base forms colourless crystalline masses soluble in water 1 in 20, very soluble in Chloroform, Absolute and 90% Alcohol, Ether and Benzol: less readily in Petroleum Ether, readily in Eucalyptus Oil.

Ephedra varieties and alkaloid content.—P.J. ii./27,118.

Indian Varieties give good yield of pseudo-Ephedrine; equally active and cheaper.—R. N. Chopra, B.M.J. ii./31,906.

Dispensing Note.—Ephedrine preparations should be kept in stoppered amber bottles.

Compatibility.—Both the Sulphate and Hydrochloride appear to be compatible in the cold with chemicals likely to be prescribed with them, *e.g.* the Bromides, Iodides, Carbonates, Bicarbonates, and Sodium Salicylate. Reasonable precautions are needed as Ephedrine is a delicate alkaloid.

Pharmacology.—Effects are similar to Adrenalin but more prolonged, the outstanding effect being circulatory stimulation. It has mydriatic powers, but it is not used clinically for that effect.

Cumulative effects apparently not produced. The M.L.D. when given *per os* to rabbits was found to be 0·59 Gm. per kilo.—K. K. Chen, Jl. Pharm. & Exp. Therap., Feb. '26,61-92. *For further information see Refs., postea.*

Constitution of the alkaloid.—J.C.S.A. i./20,396. Studies of Ephedrine.—K. K. Chen and C. F. Schmidt, Jl. Pharm. & Exp. Therap. Vol. XXIV '24,339: Feb. '26,61: July '26,64: B.M.J. ii./27,593.

Uses.—Asthma and hay fever have been much treated by means of its salts. Other suggestions are its employment in obstetric shock and collapse, headache, nocturnal incontinence, and for analgesic effect in leprosy.

Antidotes.—Fatalities may occur through inadvertence or intention. We know of a case of a child of 2½ taking 4 grains.—H. Gordon, B.M.J. i./32,737. The pulse was over 200 and there was continuous hiccoughing. Emetic of Salt was given and later sugar and Sod. Bicarb. and a hot bath to reduce blood pressure. Successful. For an adult a strong saline purge is suggested and a vasodilator if blood pressure is high, which is *not necessarily the case. Vide refs. under Pharmacology and Asthma*—pp. 399, 400.

***Ephetonin** (T.M. 476,189) is Ephedrine synthetically prepared. 4 mgr. of the synthetic are stated to be equivalent to 2 mgr. of the natural alkaloid.—F. R. Curtis, L. ii./28,226.

A synthetic substitute, Phenylethanolamine Sulphate (*Syn.* *a*-phenyl-*b*-aminoethanol Sulphate), of the formula $(C_6H_5.CHOH.CH_2NH_2)_2.H_2SO_4$, can be produced at about 1/10th the present cost of natural Ephedrine. It is

pharmacologically similar but considerably less toxic. Clinically, it is inactive *per os* and has a weak pressor but also a weak bronchodilator effect hypodermically. Best used as a topical application to the nose, *e.g.*, in hay fever in 2 or 3% solution, when its activity is in every way comparable to that of Ephedrine.—H. Miller and G. Piness, Jl. A.M.A. ii./28,1035.

℗ **Ephedrinæ Hydrochloridum** $C_{10}H_{15}ON.HCl$=201·6078.

Dose.—Adult ½ to 2 grains (**0·03 to 0·12 Gm.**) either *per os*, hypodermically, intramuscularly, or intravenously. (*Caution*: 1 grain has been known to produce slight toxic phenomena.)

Colourless crystals readily *soluble* in Water 1 in 5, and 1 in 12 Alcohol 90%.

℗ **Ephedrine Hydrochloride Tablets,** ½ grain (**0·03 Gm.**), are made for oral or hypodermic use in asthma, hay fever, Addison's disease and for shrinking the turbinated bodies.

℗ **Ephedrine Hydrochloride Sterules** contain ¼, ½, and 1 grain (**0·016, 0·03 and 0·06 Gm.**) in 15 minims (**1 Cc.**).

℗ **Ephedrinæ Sulphas.** *Syn.* FEDRIN $(C_{10}H_{15}ON)_2H_2SO_4$=428·3256.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**). The max. daily dose is stated to be 4½ grains.

This salt, which is soluble in water 1 in 4, and 1 in 22 Alcohol 90%, has M.pt. 235 to 236° C. It is not decomposed on sterilisation.

Preparations of Ephedrine and its salts.

Ⓟ **Nebula Ephedrinæ Simplex.** *Syn.* PLAIN EPHEDRINE INHALANT. Ephedrine 1% in Liquid Paraffin with addition of 33% of Olive Oil. For asthma and hay fever.

Ⓟ **Nebula Ephedrinæ Composita.** *Syn.* COMPOUND EPHEDRINE INHALANT.

Ephedrine 1, Menthol 1, Camphor 0·5, Eucalyptus Oil 4, Thyme Oil 1, in Liquid Paraffin to 100.

Both the above are for use to the nose and in some cases to the throat, with a fine atomiser. For asthma and hay fever.

Our experiments (1931) showed:—

In regard to the Nebula Ephedrinæ Simplex that at least 30% of Vegetable Oil is needed.

Ⓟ **Nebula Ephedrinæ Aquosa.** *Syn.* AQUEOUS EPHEDRINE INHALANT.

Ephedrine Hydrochloride 1, Glyl Lavandulæ 5, Glyl Pini Pumilionis 5, Water to 100.

Intended as spray, by means of a fine atomiser, more particularly for the throat, in asthma and hay fever.

Ⓟ **Elixir Ephedrinæ.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**) containing ¼ to ½ grain.

Ephedrine Hydrochloride 8 grains (**0·5 Gm.**), Glyl Aurantii Amari, 4 drachms (**15 Cc.**), Glyl Cinnamomi 4 drachms (**15 Cc.**), Water to 4 ounces (**120 Cc.**).

Asthma is well treated by 1 to 2 drachms at bedtime: also gives relief in hay fever. For whooping cough in children ½ to 1 drachm.

Ⓟ **Elixir Ephedopyrine.**

Dose.—1 drachm well diluted with water three times daily as required. Initial dose in severe cases 2 drachms.

A Canadian preparation containing Ephedrine Hydrochloride 1 grain and Amidopyrin 12 grains in each ounce. For use in dysmenorrhœa.

Ⓟ **Unguentum Ephedrinæ.** *Syn.* Ephedrine Nasal Jelly.

Ephedrine 1, White Soft Paraffin 99.

For use in hay fever, chronic catarrh, and general atonic condition of the nasal mucous membrane.

* **Ephregel.** (T.M. 517928). A combination of Ephedrine and Adrenalin as a nasal jelly, producing contraction of the capillary blood vessels with blanching effect, to reduce congestion, *e.g.*, of the nasal mucous membrane, in hay fever, rhinitis, and acute colds.

* **Epinalin.** (T.M. 505944). Each Cc. contains Adrenalin 0·0001 Gm. (=1 in 10,000) and Ephedrine Sulphate 0·02 Gm. (=1 in 50). Nasal spray in asthma and hay fever.—P.J. ii./30,420.

References to Literature.

The principal and most important of the *Ephedra* alkaloids was almost unnoticed until 1924. It was first isolated and named in 1887 by a Japanese, Nagai.—C.D. i./30,9.

Ephedrine should be classed as P1—J. Grier, P.J. ii./28,269 and P. H. Marsden, *ibid.*

Ephedra alkaloids. Ephedrine can exist in six forms. The ratio of *l*-Ephedrine to *d*-pseudo-Ephedrine varies in Ma Huang. The former is the important base.—T. and H. Smith, P.J. ii./29,606.

Most of the supply of *Ephedra* used at Darmstadt comes from South of Spain.—P.J. i./31,380.

Ephedrine Hydrochloride Estimation. To a solution of 0·5 Gm. in 50 Cc. water add 5 Cc. Nitric Acid and 30 Cc. N/10 Silver Nitrate. Back-titrate excess with N/10 Ammonium Sulphocyanide, using Ferric Ammonium Sulphate. 1 Cc. N/10 Silver Nitrate=0·02016 Gm. Ephedrine Hydrochloride.—E. Merck, P. J. i./30,477. The writer found a sample 99·2% pure.

Synthetic Ephedrin, etc.—R. R. Bennett, L. i./29,1390.

Pharmacology.

The action of some tertiary amines related to Ephedrine.—F. R. Curtis, Jl. Pharm. & Exp. Therap., April, '29,321.

Insomnia quite a characteristic effect with Ephedrine. Sweating occurs with very large doses. No deaths have been recorded, but some quite serious collapse cases.—Prof. Gunn, B.M.J. i./29,954.

Chronic poisoning following ½ grain thrice daily for four months.—W. H. Higgins, Jl. A.M.A. i./29,313.

Doses of ¼ to 1 grain orally contract the engorged nasal mucosa and stop excessive secretion, giving relief for several hours.

Toxic effects have been observed in a few cases, consisting of giddiness, headache, thirst, nausea, palpitation, insomnia, and bladder irritation. Large and repeated doses should be avoided. Some patients need carefully regulated doses. Very large doses cause diaphoresis.

10 mgr. of Ephedrine subcutaneously may cause gangrene and necrosis at the site of injection, but smaller doses do not. Adrenalin is said to be two and a half times as efficient as Ephedrine.—J. E. Nadler, P.J. ii./27,73 ; see also *ibid.* **94,** 176 (effect on blood sugar intravenously).

A mixture of Ephedrine, Adrenalin and Potassium Sulphate produces local anæsthesia as intense as mixture containing Novocain in place of Ephedrine, though Ephedrine alone has no anæsthetic effect. Low toxicity. Suggested for use in dental surgery and ophthalmic work.—Per Pres., April, '28,132.

Adrenalin is 100 times more potent than Ephedrine Sulphate, but its toxicity is only 50 times that of Ephedrine injected hypodermically.—C.D. ii./27,818.

The pressor action of Ephedrine is reversed by Ergotamine.—F. R. Curtis, Jl. Pharm. & Exp. Therap., Sept., '28,41.

Asthma.

Nausea and vomiting likely if Adrenalin has been previously given. Some tolerance to drug in 15% of 39 cases. Further investigation necessary as to possible renal irritation—red blood cells and casts found in urine of several patients after short course.—L. i./28,144.

Many people fail to respond to Ephedrine at all. There is frequently a transient fall in blood-pressure initially, immediately followed by a well-marked rise, or rather, series of rises. The rise is much greater after injection than after oral use, but the latter has more lasting effect. Given by injection the rises rapidly succeed each other and are few, whereas orally the period between rises is longer and the series persists for an hour or more. The fall between rises is often precipitous, but does not go below the patient's normal blood-pressure, until the rises have ceased when ***it falls considerably below normal*** and ***remains subnormal for about an hour.*** During the rises there is a feeling of well-being, but during the after-fall there is coldness, renal pain, hunger pain and sometimes colic.—J. H. Thompson. Discussion at the Roy. Soc. Med., May 14,1929. B.M.J. i./29,954. Though it has the advantage over Adrenalin of effectiveness *per os* and giving longer immunity from attacks, it may cause tremor, palpitation, insomnia, and sometimes inability to micturate. ¼ grain instead of ½ grain tablets should be made.—Frank Coke, *ibid.* The first dose seems to act marvellously, but subsequent doses seem to do nothing.—J. Freeman, *ibid.*

A useful prophylactic agent. Psychological effect of being able to prevent acute attack. ***Peptone Injections*** prior to Ephedrine of value.—A. Dingwall Fordyce, B.M.J. i./31,166.

Ephedrine acts less rapidly than Adrenalin, and only controls minor degrees of bronchial spasm—quite useless in severe paroxysms.—A. F. Hurst.

Ephedrine *per os* for asthma found of value, but may cause subsequent difficulty in micturation.—M. R. Sagar, B.M.J. ii./30,716.

A diaphoretic, analeptic, and sedative in cough, known for centuries in China. Bronchial asthma treated by 0·005 Gm. thrice daily.—Jansen, per P.J. ii./27,10.

Hay Fever.—Treated with 1 grain doses *per os* in capsules, 5 to 10 capsules per week. Toleration varied. Worthy of trial in coryza.—Am. Jl. Med. Sci., Oct., '26, per P.J. ii./27,10.

Leprosy.—*Per os* relieves nerve pains. More lasting and efficient than Adrenalin injections.—E. Muir, I.M.G., April 28, '28,198.

Ephedrine in painful accompaniments of.—R. G. Cochrane, L. ii./29,551.

Leprous reaction. The nerve pains controlled during reaction period with Ephedrine Sulphate or Hydrochloride ½ grain thrice daily.—R. Green, Jl. Roy. Soc. Trop. Med., Jan. 30, '29,376.

Low Blood Pressure.—1/8 to ¼ grain produces very satisfactory rise in pressure and no toxic symptoms. ½ grain caused giddiness.—H. W. Hales, L. ii./28,360.

Chronic vascular hypotension. 9 cases treated. Rise in systolic pressure, remaining up for 4 hours.—L. ii./28,144.

Doses of 0·05 to 0·125 Gm. *per os* or subcutaneously, raise systolic and diastolic blood pressure, and decrease pulse rate for several hours. Also stimulate heart action and tend to increase output of urine.—T. G. Miller, Am. Jl. Med. Sci., per Jl. A.M.A. ii./25,1159.

Low blood pressure following influenza, pneumonia, etc. The power of Ephedrine to raise blood pressure appears to be decreased in arteriosclerosis, debility, and hypertension.—Jl. A.M.A., '31,96,480.

Warning against use in patients with cardiac injury.—Per Pres., Feb., '29,70.

Myasthenia Gravis.—Personal experience of a medical victim after influenzal pneumonia. Progress with Ephedrine after none with Adrenalin and thyroid.—H. Edgeworth, Jl. A.M.A. i./30,1136.

Nocturnal Incontinence in Children.—Ephedrine ½ grain at bedtime for child from 10 to 12 almost specific. Bladder emptied before and 2 hours after going to sleep.—L. E. Parkhurst, B.M.J. ii./30,1103.

Obstetric Shock and Collapse.—1 grain in 8 Cc. Normal Saline intravenously. Also in gynæcological cases to lessen shock of operation.—J. H. Hannon, B.M.J. i./29,954.

POLIOMYELITIS.—Intrathecal injection in an effort to check meningeal irritation, and thus prevent involving the nerve tissue proper.—Arch. Int. Med., Jan., '30,102, per B.M.J.E. i./30,52.

POST-OPERATIVE COLLAPSE.—Ephedrine preferred to Adrenalin.—B.M.J.E. i./30,16.

SHOCK FROM TRAUMA OR HÆMORRHAGE.—Intravenous injection of 15 mgr. of value.—C. A. Johnson, Jl.A.M.A. i./30,1388, per M.A. '31,376.

SPINAL ANÆSTHESIA.—Of value in restoring arterial tension. Give 0·1 Gm. subcutaneously before systolic pressure drops below 100.—Jl. A.M.A. /27,1136. The fall in blood pressure following puncture is probably one of the greatest drawbacks of the procedure. Might be overcome by Ephedrine.—L. i./31,353.

WHOOPING COUGH.—Dose of ¼ grain *per os* in watery solution to children of one year, and 1/8 grain for those younger, night and morning, of value. Most useful during second stage. No serious toxic symptoms.—B.M.J.E. i./28,28.

Useful during second stage. 0·016 Gm. *per os* night and morning in aqueous solution to children over one year, and 0·008 Gm. under one year.—Per Pres. Feb., '29,70.

ERGOTA.

℞ '*Ergot of rye and preparations of Ergots.*'

℞ **Ergot of Rye** (*B.P.* '14).—*Syn.* SECALE CORNUTUM. P.Ital V., P. Belg. IV. ESPOLÓN DE CENTENO, CORNEZUELO DE CENTENO F.E. VIII. (*The latter is assayed biologically.*)

The sclerotium of the fungus *Claviceps purpurea* (*Pyrenomyceles*) on *Secale cereale* (*Graminaceæ*).

Dose.—15 to 60 grains (**1 to 4 Gm.**) in recent powder infused in boiling water. FR. CX.—*Maximum single dose* 15 grains. *Maximum during* 24 *hours,* 60 grains approximately.

The specific alkaloids of Ergot are Ergotoxine and Ergotamine, the total content being 0·1 to 0·2%. The crystalline Ergotinine has been proved to be inert.—Prof. A. J. Clarke, B.M.J. i./27,763, *vide postea.*

Ergotamine and Ergotoxine are the same substances from the pharmacological viewpoint. Whether they should be regarded as different alkaloids of Ergot, the chemist has not decided.—J. H. Burn, in reply to A. O. Bentley, P.J. i./27,565 ; see also *ibid.* 589, 615 (Ergotoxine Ethanesulphonate), 652, 681.

History and Chemistry.—Prof. J. Barger, P.J. ii./20,470.
Heat and moisture, effect of, on Ergot.—G. Tate, P.J. i./21,485.
Cultivation of Ergot.—P.J. ii./21,87.

Polish and Russian Ergots contain 0·06% Ergotoxine, *i.e.*, much less than Spanish or Portuguese.—F. Wokes, B.M.J. i./30,800.

Preservation.—Not more than 1 year old (U.S. X., assayed biologically) and to be kept whole, not powdered.—(*B.P.* '14) ,P.Ital., P. Belg., F.E. and F.I. *It should be kept in well closed vessels,* adding a little Chloroform or Carbon Tetrachloride to prevent attack by insects. Old Ergot is practically useless.

Antidotes.—See chapter on.

Uses.—Almost entirely for its action on the uterus, stimulating muscular contraction, and so to check bleeding after parturition, and from the presence of fibroid tumour, also to promote involution.

Ergotin causes spasm of arterioles and rise of blood pressure, by acting directly on the vessels, independently of the central nervous system. It is useful in polyuria.

Is also given to check night sweats, spermatorrhœa and menorrhagia. Suggested for sleeplessness, by causing cerebral anæmia.

All diseases in which a drugi nducing muscular contraction is indicated should, according to some authorities, be treated by Ergot, *e.g.* disturbances of the circulatory system, skin affections, acne rosacea, also nervous complaints (excessive smoking).

In surgical shock 15 minims of Injection are useful.

For disordered circulation and for headache (hypodermically), alcoholism, hysteria and in acute inflammatory infections—meningitis, pneumonia, pericarditis, Ergot has also been used.

For hæmoptysis and pneumonia it is conveyed as of little utility.—B.M.J. i./30,1007. In chorea it is a useful drug.

De-fatted Ergot Preparations.

Defatted Ergot powder probably the best Ergot preparation for giving *per os.*—Wokes and Elphick, Qtrly. Jl. Pharm., 1929, 2,539. —L. ii./29,1040.

℗ ✱**Erbolin** (T.M. 510459). *Dose.*—One or more capsules as required, usually 1 capsule thrice daily, the contents to be emptied on the tongue and followed by a hot drink.

A stabilised and standardised Ergot in powder form, supplied in capsules each containing the equivalent of 0·5 mgr. (1/120 grain) Ergotoxine Phosphate.

Uses.—For routine in obstetrics; to induce involution of the uterus; in post-partum hæmorrhage, and wherever Ergot is indicated.

The stability of liquid Ergot preparations cannot be relied upon, owing to deficiency of Ergotoxine which tends to decompose in such preparations. Defatted Ergot powder remains stable indefinitely and produces the entire specific effects of Ergot.

℗ **Extractum Ergotæ Liquidum.** 1=1 of Ergot. (*B.P.* '14), '100%.'—F.I.

Dose of B.P. '14 *preparation.*—10 to 30 minims (**0·6 to 2 Cc.**) or more. It is best recently prepared (not more than 6 months old).

Fr. Cx., 1=1 by wt. Maximum *dose* during 24 hours 6 Gm. Prepared by maccrating with water containing 0·05% Tartaric Acid, and further treatment.

Samples made with 2% Hydrochloric Acid and 40% Alcohol, 40% Alcohol only, 10% Glycerin and 40% Alcohol, 2% Acetic Acid and 40% Alcohol. First found to be five times as strong as the second.—J. H. Franklin, P.J. i./27,52.

The Liquid Extract of Ergot *B.P.* '14, does not contain the specific alkaloid and it is not of any medicinal value. At best it can only be a solution of Histamine. The crude drug will have to be assayed before it is used.—J. H. Burn, P.J. ii./26,665; i./27,133 ; ii./27,490 ; i./28,126.

Maximum yield of Ergotoxine obtained when extracted with a mixture of Tartaric Acid, Citric Acid or Hydrochloric Acid, in 50% Alcohol. According to J. H. Burn and S. Wokes, the extract deteriorates rapidly.—L. ii./29,1040.

Chassar Moir, however, ***speaks highly of it***—perhaps it contains a new body.—B.M.J. i./32,1119.

P. BELG. IV. uses Tartaric, P. ITAL. V. Acetic, and F.E. VIII, Hydrochloric Acid in their extractions.

Uterine contraction is caused by Ext. Ergot. Liq. *B.P.*' 14 *per os,* this effect being thought due to the Histamine content.—The Pharmacist of a London hospital.

℗ **Fluidextractum Ergotæ, U.S. X.**—*Average dose* 2 Cc. is prepared by use of 2% Hydrochloric Acid in diluted Alcohol and is then assayed biologically.

The U.S. Ext. Ergot. Liq. *loses half its activity in 2 or 3 months.*—J. H. Burn, B.M.J. i./30,507.

A new method of extraction. The alkaloids and amines removed as tartrates and combined to make either liquid or dry extract. Stated to have given good therapeutic results.—H. Golaz, per Qtrly. Jl. Ph., '29,138.

℗ **Normal Liquid Extract (Physiologically Standardised)** may be of such strength that 0·66 Cc. will cause a rise in blood pressure of 60 m.m. in an animal weighing 1,500 Gm. A definite amount is given to a cat and tracings are taken of the blood pressure and uterine contractions, *i.e.*, the effect desired when Ergot is given to the patient.

℗ **"Ergot Aseptic."** Concentrated and sterilised liquid extract in 1 Cc. bulbs, representing Ergot 2 Gm.

Colorimetric Tests for Ergot Alkaloids.

Para-dimethylamidobenzaldehyde.

The credit of employing this as a reagent producing a colour with Ergot Alkaloids (Ergotamine, Ergotoxine, and Ergotinine-Tanret) is due to H. W. van Urk, who has made observations, using both the alkaloids and Tinctura Secalis Cornuti, P. Ned., and the Liquid Extract, P. Ned. The colour is obtainable both as a ring reaction, using dilute spirituous solution with the Sulphuric Acid beneath, and as a reaction on a watch-glass on a water-bath. In the latter instance the material to be tested is evaporated with a few drops of 1% Alcoholic 'Dimethyl' solution and a little dilute Sulphuric Acid (in the neighbourhood of 2% acid).

A large number of other organic compounds give various colour effects with this reagent which should be borne in mind, *e.g.*, Phenolphthalein, Resorcin, Salicin, Morphine, Codeine and Heroin (see Pharmaceutisch Weekblad, 1929,66, pp. 101 and 473). The colour with Ergotinine is, however, a marked bluish-violet. Ergotamine and Ergotoxine give a violet purple. The differences in tint do not permit distinction.

M. I. Smith of the Hygienic Laboratory, U.S. Public Health Service U.S.) Public Health Reports, Vol. 45, No. 26, June 27, 1930, abst. P.J. i./31,105), has issued extensive data with a view to developing the test for assay of Ergot preparations. Van Urk's method was modified, using a Tartaric Acid extractive. The influence of light on the reaction was studied, *inter alia.* With decreasing intensity of light the reaction is correspondingly prolonged and somewhat less regular. The *Acid factor* is also of importance. It is best to use 1 Cc. Concentrated Sulphuric Acid (containing 2·5 mgr. of the Aldehyde) to the alkaloid in 2 Cc. of 1% Tartaric Acid. Sulphuric Acid is preferable to Hydrochloric Acid. The results approximated the Bio-Assay method of Broom and Clark (Jl. Ph. & Exp. Therap., 1923,59).

To 2 Cc. of solution of the alkaloid in 1% Tartaric Acid, run in from a burette down the side of the tube exactly 1 Cc. of N/60 'Dimethyl' (0·25%) in concentrated Sulphuric Acid, mix and place in sunlight if possible. Maximum colour is then reached in 10–15 minutes; diffuse light needs ½–2 hours. Read intensity in a colorimeter against standard Ergotamine Tartrate solution.

The method (as modified by the Brit. Pharm. Commission), using 5 Cc. of Ext. Ergotæ Liq., extracting with Ether, and obtaining a Tartaric Acid solution, was applied to a number of liquid extracts of commerce, and the remark is made by Smith that *the colour is not specific for Ergot alkaloids,* though the test on broad lines agrees with Bio-Assay results. *It does not differentiate* specifically the *physiologically active Ergotoxine* and *Ergotamine* from the inactive Ergotinine and Ergotaminine.

Ammonium Sulpho-Molybdate Colour Test.—*Martindale.*

The author has carried out investigations with a view to possible improvement of Ergot Assay by colorimetric means.

A number of the customary alkaloidal colour reagents were tried, and in some instances (*e.g.*, the green obtainable by Mandelin's Phospho-Tungstic Acid) the presence of Tartaric Acid used in the extraction interfered and had to be eliminated.

The upshot of the investigation is to suggest that Ammonium Sulpho-Molybdate might replace para-Dimethylamidobenzaldehyde.

The test may be used as follows :

(A) Ammonium Molybdate 1 Gm. is dissolved in Concentrated Sulphuric Acid 100 Cc. To 1 Cc. of the 40 Cc. of Tartaric Acid solution of the alkaloids made up to 50 Cc. for convenience (above referred to, which represents 0·1 Cc. Liquid Extract), is added 1 Cc. of the reagent. A slate-blue colour develops *at once* and can be compared with a Standard Ergotoxine solution, or with a sealed Standard Tint Tube made with Aniline dyes, and without the aid of expensive apparatus.

Or the following may be preferable :

(B) Make up the acid extractive to 50 Cc. (for convenience in calculation). Evaporate 1, 2½, 5, 10, 12½ and 15 Cc. to dryness in white basins. Add 50 mgr. Ammonium Molybdate in powder and 2 *drops Sulphuric Acid* to each, mixing intimately, and observe the colours against volumes of Ergotoxine Ethanesulphonate solution, which may be of strength 0·006%. The colour is produced by Ergotoxine and by Ergotamine.

Supposing it to be found that the colour from 12½% Cc. of acid extractive equals that from 5 Cc. of Ergotoxine Ethanesulphonate solution, it follows that 1·25 Cc. of the liquid extract under examination = 0·0003 Gm. Ergotoxine Ethanesulphonate. Therefore the liquid extract contains 0·02% Ergotoxine (the Ethanesulphonate containing 84% of Base), or, according to the Pharm. Commission's approximation, 0·033% approx. of Total Alkaloids.

From the work done, we admit the proposal as a *quantitative* test needs further research.

It is of interest to remark that though Ammonium Sulpho-molybdate gives various colours with divers alkaloids the slate-blue with Ergotoxine is very distinctive and delicate. Tryptophane and Skatol do not give the blue colour but a *green*—except in presence of water.

The possibility of slight decomposition of the alkaloids by evaporating must be taken into consideration.

ℙ1 **Extractum Ergotæ** (*B.P.* '14.) *Syn.*—Ergotin (*B.P.* '98), Ergotina Bonjean, P. Ital. V., F.E. VIII., P. Belg. IV.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

B.P. '14 and Fr. Cx.—an aqueous extractive precipitated by alcohol and evaporated.

In chronic cases of hæmaturia occasionally useful.—Tirard.

ℙ1 **Tablets and Pills,** 1, 2, and 3 grains. *Dose.*—1 to 3.

ℙ1 **Capsules of Ergotin** contain 3 and 5 grains (**0·2 and 0·3 Gm.**). (*cf.* also Capsules Apiol and Ergotin.)

ℙ1 **Tablets of Ergotin, Senecin Compound** contain Ergotin ½ grain, Senecin ½ grain, Hydrastin ½ grain, Hamamelin 1 grain, Chloretone 1 grain. Useful in dysmenorrhœa and menorrhagia.

ℙ1 * **Ergodex** (T.M. 515019) *Dose.*—10 to 30 minims. (**0·6 to 2 Cc.**). Contains 0·03% Ergotoxin. Contains the whole alkaloidal content of Ergot and is suitable for oral use. It retains full activity for 12 months.—B.M.J. i./31,501.

ℙ1 **Injectio Ergotæ Hypodermica** (*B.P.* '14).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Ergot Extract 33% in Distilled Water with 1% Phenol. Should be freshly prepared.

Use.—A dose of Ergotin, injected deeply into the gluteal muscles just before delivery, generally promotes uterine contraction.

℞ **Sterules, Hypodermic** contain 10 minims of this injection.

℞ **Injectio Ergotina et Morphinæ Intramuscularis,** S.D.H.

Dose.—10 minims (**0·6 Cc.**).

Ergotine 10 grains, Morphine Acetate 1 grain, Water to 30 minims.

℞ **Liquor Ergotæ Ammoniatus.**—1=1 of Ergot.

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Made with diluted Ammoniated Alcohol. The combination of Ammonia and Ergot is indicated in some forms of post-partum hæmorrhage, etc. In dose of ½ to 1 drachm is useful in second stage of labour when the pains are feeble but the passages are normal.

℞ **Elixir Ergotæ cum Ferro.**—*Martindale.*

Dose.—2 drachms, repeated if necessary.

Dissolve Iron Pyrophosphate (U.S. VIII., *no other*) 5 grains in 1 drachm of warm water and add to Liquid Extract of Ergo 10 minims, mixed with Simple Elixir (*B.P.C.* 1894 50 minims).

For anæmia and excessive (or diminished) menstruation in young women.

℞ **Tinctura Ergotæ Ammoniata.** (*B.P.* '14).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Strength 1 of Ergot in 4 of finished Tincture.

The ammoniated Tincture of Ergot found to be the most potent—far more so than the liquid or other Extract.—H. Spencer, B.M.J. ii./22,1174.

An Ammoniated Tincture found to contain more than one-third the activity of the U.S.P. fluid extract.—C.D., Jan. 15, '26, p. 71.

The only *B.P* '14 preparation of Ergot where any quantity of the active principle is retained is the Ammoniated Tincture, which retains one quarter, other preparations lose 97%.—Prof. A. J. Clark, B.M.J. i./27,763.

℞ **Mistura Ergotæ Sedativa S.H.**

Ammoniated Tincture of Ergot 10 minims, Potassium Bromide 7½ grains, Potassium Chlorate 7½ grains, Glycerin 15 minims, Chloroform Water to 1 ounce.

℞ **Mistura Ergotæ Composita.**

Dose.—½ ounce (**15 Cc.**).

Liquid Extract of Ergot 20 minims, Ferric Chloride Solution 10 minims, Quinine Hydrochloride 2 grains, Glycerin 1 drachm, water to ½ ounce.

Mistura Ergotæ Alkalina. St. M's. H.

Dose.—1 ounce (**30 Cc.**).

Ammoniated Tincture of Ergot ½ drachm, Iron and Ammonium Citrate 3 grains, Tincture of Ginger 20 minims, Chloroform Water to 1 ounce.

℞ **Ergotinina,** *Ergotinine Cristallisée,* $C_{35}H_{41}N_5O_6$, Fr. Cx. Supp.

Dose.—$\frac{1}{200}$ to $\frac{1}{64}$ grain (**0·0003 to 0·001 Gm.**).

Fr. Cx. has the latter as *max. single dose.*

An alkaloid in minute yellowish crystals, insoluble in water, ***Soluble*** in Alcohol (1 in 200 of 95% Fr. Cx.), less in Ether, very in Chloroform.

This alkaloid has been proved to be inert. Ergotoxine is the active constituent, see Absts., p. 401.

℞ **Ergotininæ Citras.**

Dose.—$\frac{1}{150}$ to $\frac{1}{30}$ grain (**0·0004 to 0·002 Gm.**).

A soluble salt of the base, in greyish powder.

℗ **Hypodermic Tablets** contain $\frac{1}{200}$ and $\frac{1}{100}$ grain.

℗ **Ergotoxine.** $C_{35}H_{41}O_6N_5=627{\cdot}3696$.

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain. Is described as amorphous and hardly soluble in water, and strongly active physiologically (see p. 401) on the uterus—raises blood pressure, and is the principle in Ergot that produces gangrene in the cock's comb on injection. Solutions in dilute Caustic Alkali are injected.

Ergotinine is stated to be the Anhydride of Ergotoxine.

℗ **Cornutine** is apparently impure Ergotoxine.

℗ **Hypodermic Tablets** contain Ergotoxine 1/100 grain, also ℗ with Morphine Sulphate 1/6 grain, and ℗ with Strychnine Sulphate 1/20 grain, the latter being used in collapse or shock.

℗ **Injectio Ergotoxinæ Hypodermica** 0·12% ($\frac{1}{100}$ grain in 8 minims).

Dose.—2 to 15 minims (**0·1 to 1 Cc.**).

℗ **Ergotoxine Ethanesulphonate**—A new white, crystalline, stable and soluble salt. *Dose.*—$\frac{1}{100}$ to $\frac{1}{50}$ grain hypodermically.

Ergotoxine Ethanesulphonate 1/100 grain in 1 Cc. replaces Injectio Ergotæ Hypodermica at London Hospital.—C. H. Sykes, P.J. ii./31,513.

Ergotamine of Stoll.

In the past it has been held that this is identical with Ergotoxine. Pharmacologically, as already stated, they are the same, but it is now established that they are different chemically. The following recent discussion is of interest.

Ergotoxine and Ergotamine are the active principles of different Ergots. Ergot from fescue (a New Zealand grass) examined.—S. Smith and G. M. Timmis, L. ii./30,652.

According to Prof. Stoll, Ergotamine ($C_{33}H_{35}N_5O_5$) is contained in Ergot of Rye and used as Tartrate in making **Femergin** (*vide infra*), and it possesses the specific properties of the active principle of Ergot.—L. ii./30,873.

Ergotoxine may perhaps be converted into Ergotamine in manufacture. Rye may perhaps be infected with a type of Claviceps, producing Ergotoxine or Ergotamine exclusively in some districts.—Reply to Prof. Stoll by S. Smith and G. M. Timmis, L. ii./30,994.

Smith and Timmis maintain as already stated.—L. ii./30,1148. Prof. Stoll's firm have established a strong presumption of complete identity in action between the two alkaloids, but clinical records exist for the action of only one of them.—H. H. Dale, L. ii./30,1149.

Since the introduction of Ergotamine a number of cases of severe gangrene have been attributed to it by certain authors.—B.M.J. ii./31,1100.

Ergotamine Tartrate is official in P. Belg. IV. with formula $(C_{33}H_{35}O_5N_5)_2.C_4H_6O_6+2CH_3OH$.

℗ ✱ **Femergin** (T.M. 414931) **Tablets,** contain 0·001 Gm. Ergotamine Tartrate (Sandoz).

URTICARIA of vagotonic or sympatheticotonic origin treated with Ergotamine Tartrate. *Dose.*—2 to 3 mgr. *per os* daily for 2 to 3 weeks.—B.M.J.E. ii./29,44.

GRAVES'S DISEASE.—Ergotamine Tartrate injections, 1 mg. intramuscularly, gave improvement, but not in severe cases.—Per Pres., Nov., '29,391. Or subcutaneously 1/250 grain each morning, repeated in the evening, if tolerated. Suspend for a week or two after 20—25 days.—Per Pres., Nov., '29,391.

MIGRAINE treated by Ergotamine Tartrate, 2 mgr. daily, by mouth, with additional 2 mgr. when an attack is threatened.—Per Pres., Jan., '29,33.

Ergot Amines.

℗ ✱ **Ernutin** (T.M. 277883).—A Solution physiologically standardised for hypodermic use, containing Ergotoxine, Tyramine and Ergamine (*v. infra*). In two forms (*a*) for oral. *Dose.*—30 to 60 minims to be given *per os* after labour is completed, every three hours until contraction effected, and (*b*) for hypodermic use. *Dose.*—5 to 10 minims after expulsion of the placenta.

In addition to the alkaloid Ergotoxine, Ergot contains certain **Amines.** Two are of importance.

(*a*) *p*-hydroxyphenylethylamine (Tyramine *vide postea*) produced by splitting

off CO_2 from Tyrosine. This has an action similar to, though weaker than, Adrenine, produces contraction of the cat's uterus in the pregnant, and inhibition in the non-pregnant, condition.

(*b*) **Histamine** or Amino-Ethylglyoxaline $C_3H_3N_2—CH_2—CH_2.NH_2$. *Syn.* P1 ✱**Ergamine** (T.M. 324681) (*i.e.*, β-Iminazolylethylamine) produced from Histidine by splitting off CO_2. It is a perfectly stable substance, *and solutions can be boiled without risk of decomposition.* There is no reason why Phenol should not be added to Histamine solutions. It has intense action on plain muscle. The plain muscle fibre of the uterus in particular is stimulated to contraction by minute doses. It causes fall of blood pressure.

Hypodermic Tablets of Ergamine contain 1/65th grain (0·001 Gm.).

(**Histamine Acid Phosphate** is available in commerce.)

SPASMODIC ASTHMA in connection with Histamine, *see* Edn. XIX., Vol. I., p. 407.

Histamine, being formed by decarboxylisation of Histidine, which is derived from proteins, it is conceivable that such substances are produced in trauma. This is an explanation of shock differing from that of the acid causation theory (Almroth Wright's).—L. Hill, B.M.J. i./21,771.

Subcutaneously, Histamine excites a flow of gastric juice in man.—A. R. Matheson and S. E. Ammon., L. i./23,482.

Histamine is present in small amounts in enzymatic products, it is found among the hydrolytic products of crystallised albumin and casein, and may be obtained from acid-treated tissues, *e.g.*, the liver, the posterior lobe of the pituitary, and other tissues. It has been isolated from the intestinal wall of the ox and from aqueous extracts of the fish called *Maguro.*

Histamine is thought to occur as a labile precursor, from which it is liberated by acid and heat employed in the treatment of the organ extracts. Protein metabolism of the body may be its true source. Injected subcutaneously into human beings, it produces a violent and intense erythema all over the body, headache, conjunctivitis, paræthesias, vomiting, tenesmus, bronchial spasm and unconsciousness.—J. J. Abel, Jl. Ph. Exp. Ther., Feb., '24,1.

Injury to, or irritation of, the skin causes liberation of Histamine or an allied body which produces the reddening.—Per Pres., Oct., '28,317.

Histamine derivatives.—B.C.A. '28,A.1145.

The stimulating power of Histamine Phosphate on the ureter is greater than that of Pituitary Extract. It increases the general tonus of the ureter.—C. M. Gruber, Jl. Pharm. and Exp. Therap., Oct., '28,207.

Further on Histamine, see Vol. I, pp. 662, 665, 667, and *Pituitary Gland.*

Histamine in Relation to Blood Pressure.

Histamine is, no doubt, liberated from the tissues in response to injury. Intravenously in cats in a dose of 1 to 2 mgr. per kilo it causes respiratory disease, due to contraction of bronchiolar muscles, and rise of blood pressure, due to contraction of muscles of arterioles. Profound fall of blood pressure follows within 4 or 5 minutes. It has a powerful dilating effect on the smallest vessels. The hypothesis of '**Histamine Shock**' is that the circulation is brought to a precariously low point by depletion of the central vessels, much rich corpuscular blood remaining locked in the minute vessels and much of its fluid part finding its way into extravascular tissue spaces. Similar effects in man with small intravenous or subcutaneous doses. Larger doses subcutaneously (6 to 8 mgr.) cause fall of blood pressure, respiratory distress, contraction of stomach, and occasionally collapse.—'The Blood Vessels of the Human Skin and their Responses,' Thomas Lewis (1927), 108—109 (H. K. Lewis).

CHEYNE-STOKES RESPIRATION.—Normal breathing resumed and continued for about 6 hours after small dose of Histamine subcutaneously. Slight headache, feeling of warmth, and occasional reddening of skin of arms and neck—symptoms pass off in an hour. Following two further injections next day Cheyne-Stokes respiration ceased altogether.—F. Kisch, Klin. Woch., 1930,1819, per Pres., Nov., '30,655.

We know of a case in which it was tried (in the form of Ergamine). The immediate effect was intense headache and flushing of the face lasting for an hour.

Apomigran.

A homœopathic proprietary containing Histamine and Sodium Sulphate. In bile and liver affections.

℞ *p.*-**Hydroxyphenylethylamine.** *Syn.* ✱ TYRAMINE (T.M. 309250): UTERAMIN, SYSTOGEN, $OH.C_6H_4.CH_2CH_2NH_2 = 137{\cdot}0938$.

Dose.—1/12 grain (**0·005 Gm.**), repeated if necessary.

An organic base which is stated to be the chief active principle of aqueous extracts of Ergot.

It contributes along with Ergotoxine to the action of Ergot, and is a constituent with the latter in **Ernutin.**

Uses.—Its action is similar to that of the suprarenal active principle, but weaker, slower, more persistent and less toxic. Given hypodermically or by the mouth it produces a marked rise of blood pressure, with increased vigour of the heart's action. Administered in shock or collapse and for producing contraction of the uterus *post partum* ,but it is stated to have no value in obstetrics (*v. infra*).

Guggenheim found doses o f0·02 Gm. para-oxyphenyl-ethylamine failed to have any influence on parturient women.—P.J. i./13,905.

℞ **Hypodermic Tablets of Tyramine** contain $\frac{1}{3}$ grain (0·02 Gm.).

Other Ergots than that of Rye are equally or more active. Ergot of Fescue grass from New Zealand shows chemically 0·34% alkaloid—Wheat Ergot from Sweden contained 0·12%.—F. H. Carr and H. H. Dale, P.J. ii./13,130. *See also* H. A. D. Jowett, P.J. i./13,364.

Tyramine has no value in obstetrics. Histamine, 2 mgr. hypodermically produces a powerful but short-lived effect and exhausts uterine activity. The specific alkaloid (Ergotamine or Ergotoxine) exerts a prolonged action ideal for use after delivery.—A. Bourne and J. H. Burn, P.J. ii./27,490.

℞ **Acidum Scleroticum.**—*Syn.* SCLEROTINIC ACID. $C_{12}H_{19}NO_9(?) = 321{\cdot}1562$.

Dose.—$\frac{1}{2}$ to $\frac{3}{4}$ of a grain (**0·03 to 0·05 Gm.**) hypodermically in 10 minims of water.

An amorphous brown hygroscopic acid principle obtained from Ergot. Hæmostatic and anti-epileptic.

℞ **Hypodermic Tablets** contain $\frac{1}{16}$ grain (**0·004 Gm.**) **Sclerotic Acid.**

ERYTHROL NITRAS.

$CH_2.ONO_2 - (CH.ONO_2)_2 - CH_2.ONO_2 = 302{\cdot}0788$.

Syn. ERYTHROL TETRANITRATE; NITRO-ERYTHRITE. ERYTHRO-TETRANITRAL.

Dose.—$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**), increased to 3 grains or more in tablet form *vide infra.*

In colourless and slightly tar-like smelling crystals, ***soluble*** in water about 1 in 20,000, about 1 in 60 of absolute alcohol; melting point, 61° C. It is formed by dissolving erythrol (a sugar obtained from various lichens, e.g., *Rocella tinctoria, R. fuciformis*, etc.), in fuming nitric acid, and precipitating by sulphuric acid; is explosive, except when in solution in chocolate.

Uses.—As a vasodilator like Nitroglycerin and Amyl Nitrite. Its slight solubility as against Nitroglycerin (1 in 800) renders action slower and more prolonged in reducing blood-pressure. Employed in angina pectoris, chronic Bright's disease, nephritis, aneurism, Raynaud's disease, dyspnœa, headache, and nervous affections.

For angina, to avert paroxysms, even half a drachm a day has been taken.

Tabellæ Erythrol Nitratis.—*Martindale. Dose.*—1 or 2.

Contain ½ grain (**0.03 Gm.**), combined with chocolate. **Tabellæ** ⅛, ¼ and 1 grain (**0·008, 0·016** and **0·06 Gm.**) are also prepared.

Præcordial pains are promptly relieved by a tablet three times a day.

Daily use of the tablets, beginning with ½ grain thrice daily and gradually increasing, will ward off attacks. Cumulative effect or tolerance has not been observed.

Intermittent closing of cerebral arteries. Various questions to consider as to treatment: Spirit of Nitrous Ether controls the irritable tonicity of the vessel walls; where symptoms are urgent Erythrol Nitrate ¼ to ½ grain repeated every 3, 4, or 6 hours, as required, is advised.—W. Russell, B.M.J. ii./09,1110.

Melancholia, in which affection the blood pressure is often found abnormally high, is frequently relieved by lowering it. Start with ½ grain tablets twice daily and slowly increase the dose to two or three grains daily.—Robertson, B.M.J. i/11,800.

In arteriosclerosis Erythrol Tetranitrate useful.—M.A. 1911.

In aortic disease for relief of serious pain Amyl Nitrite and Nitroglycerin are employed (*q.v.*). Erythrol Tetranitrate produces little effect until half an hour after its administration, and the maximum effect is produced at the end of an hour; the arterial tension gradually increases again, but it does not return to its previous condition until about ten hours after the dose has been taken.—Tirard.

Asthma, very effective during the paroxysm, especially if followed by some hot drink, *e.g.*, Bovril; relief lasts at least 24 hours.–W.W.W.

In lead colic Erythrol Nitrate is an excellent sedative, as it relaxes the painful spasms of the intestinal coats.

Hyperpiesis. **Iscamylamine.** $NH_2.C_5H_{11}$. A liquid compound, boiling at 95°C. *See also* Adrenalin chapter. The retention of this pressor base in the body is the chief causal agent. Reduction of blood pressure the only treatment. Erythrol Nitrate of value before beginning hydrotherapeutic measures.—W. Bain, L. i./28,389.

Mannitol Nitrate, $CH_2.ONO_2.(CH.ONO_2)_4CH_2.ONO_2$=452·1104.

Syn. HEXANITRIN. NITROMANNITE.

Dose.—1 grain (**0·06 Gm.**), increased.

The nitrate of the hexahydric alcohol mannite, $C_6H_8.(OH)_6$ = 182·1092. In light acicular crystals, M.pt. 113° C.; is less soluble in water but more explosive than erythrol nitrate. Requires extra care. Is used similarly to erythrol nitrate. In angina and asthma its action is not so powerful, but probably more prolonged.

Tabellæ Mannitol Nitratis.—*Martindale.*

Contain 1 grain (**0·06 Gm.**) in chocolate basis.

Prof. Silvan (Clinique de Bologne, Italy) reported that in cases in which a hypotensive condition represents the predominant symptom, or at least the most apparent cause of many of the morbid points complained of by patients, this substance, with which one can successfully diminish and maintain for a considerable time a reduced pressure, has given satisfactory and comforting results.

Mannitol in the leaves and cork of the olive tree, seasonal variations.—P.J. i./31,105.

EUONYMI CORTEX.

The Root Bark (*B.P.* '14) obtained from *Euonymus atropurpureus* (*Celastraceæ*), the wahoo or spindle-tree.

Euonymus Atropurpureus should be carefully distinguished from spurious barks. It should show externally longitudinally striated cork and a tangentially striatified fibre and delicate threads when gently broken transversely, also medullary rays consisting of a single row of cells.—E. M. Holmes, P.J. i./18,88.

Uses.—Possesses tonic, hydragogue, cathartic, diuretic, and anti-periodic properties.

Extract of Euonymus (*B.P.* '14). *Syn.* EUNOYMIN.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm**). **Tablets**, $\frac{1}{6}$, $\frac{1}{2}$ grain. $\frac{1}{4}$ to 1 grain cholagogue, 1 to 4 grains cathartic.

A brown alcoholic extractive containing calcium phosphate to keep it as powder. In commerce chlorophyll is sometimes added. FR. CX. has EUONYMINE BRUNE, *max. single dose* $1\frac{1}{2}$ grains.

Pilula Euonymin.

Euonymin 2 grains, Extract of Henbane $\frac{1}{2}$ grain, for one pill; taken at bedtime. A cholagogue stimulant, producing no depression or headache; requires to be followed by a saline aperient in the morning.

One grain, combined with 4 grains of Iridin, is a successful purge.

Extractum Euonymi Liquidum.

1=1 made with Alcohol (90%) 4, Water 1. *Dose.*—10 to 60 minims (**0·6 to 4 Cc.**)

Tinctura Euonymi. *Dose.*—10 to 40 minims (**0·6 to 2·5 Cc.**) Strength 1 in 5 of Alcohol 45%

Liquor Euonymini et Cascara. B.P.C. *Dose.*—$\frac{1}{2}$ to 1 drachm.

Liquor Euonymini et Iridini. B.P.C. *Dose.*—$\frac{1}{2}$ to 1 drachm.

Rub Dry Euonymus Extract 3·66 and Iridin 1·83 with Alcohol 45% 50. Filter and add Potassium Carbonate 1·37 in water 25, and make up with Alcohol 45% to 100. Purgative and presumed cholagogue.

Liquor Euonymini et Pepsini (Glagsow Formulary).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Euonymin 155 grains, Pepsin Soluble (Scale) 310 grains, Dilute Hydrochloric Acid 340 minims, Alcohol (45%), 6 ounces, Chloroform Water to 20 ounces.

FEL BOVINUM PURIFICATUM.

Purified Ox Bile.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). (*B.P.*'14).

A dark greenish brown bitter-sweet mass.

Soluble in water and alcohol 90%, insoluble in ether.

Manufactured by evaporating 20 of fresh ox bile to 5, mixing with 10 of alcohol 90%, separating the precipitate and evaporating the clear fluid to thick extract consistence. It is composed of bile salts, cholesterin, lecithin and bile pigments. It is best given in '**Stearettes**' containing 5 grains. **Capsules** contain 5 grains.

Uses.—An emulsifier of fat and a stimulant to the action of the liver. Has been given in jaundice and typhoid. A small quantity diluted with water may be used as an enema in obstinate constipation. The bile of venomous snakes is said to act as antidote to their poison.

Fel Bovinum Exsiccatum.—*Dose.*—5 to 10 grains in cachets.

Dysentery has been treated with satisfactory results by rectal injection of 1½—2 ounces of fresh bile of sheep.

Extractum Fellis Bovis U.S.X. is made by alcohol extraction and adding starch so that 1 of extract equals 8 of ox gall.

Tablets of Ox Bile, Glycocholic Acid and Extract of Sage, of each 0·1 Gm. of value in gastric or duodenal ulcer.—B.M.J.E. ii./29,34.

FERRUM.

Fe=55·84.

Ferrum Redactum. *Syn.* QUEVENNE'S IRON.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Fine powdered iron containing at least 80% (U.S. 90%) metallic iron, prepared by reducing ferric hydroxide with hydrogen.

Incompatible with tannin and metallic salts.

As the human body contains only about 39 grains of iron, to give large quantities, *e.g.*, 6 to 10 grains *per diem* is futile.—H.

Pills of Reduced Iron require ⅙ to ⅓ grain Compound Tragacanth Powder to bind them. **Trochisci Ferri Redacti** contain 1 grain.

Ferri Carbonas Saccharatus (*B.P.* '14).

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Ferrous oxycarbonate, $x FeCO_3$ $y Fe(OH)_2$, partially oxidized and mixed with glucose (sugar in '98 *B.P.*), the mixture containing not less than 50% (*B.P.*'98 33%) of its weight of ferrous salt if reckoned as carbonate $FeCO_3$=115·84. P. Ital. V. requires 9·5 to 10·5% Fe.

Incompatible with tannin-containing drugs, also with acids and acid salts.

Ferri Carbonas Saccharatus Concentratus.

Four times as strong as the U.S. preparation, *i.e.*, containing about 60% of Ferrous Carbonate.

Uses.—For anæmia and chlorosis of young women. The dose may be increased up to 10 grains daily of Anhydrous Ferrous Carbonate.

Capsules and Tablets of Saccharated Iron Carbonate, contain. 5 grains (**0·3 Gm.**).

Pilula Ferri (*B.P.*'14). *Syn.* BLAUD'S PILL.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Each 5 grains contain about 1 grain of Ferrous Carbonate.

When palpitation occurs in connection with anæmia or chlorosis, the frequent employment of iron pills or of powders of reduced iron will probably remove the cause and so allay the symptoms.—Tirard.

Massive Iron Therapy—up to 60 grains Blaud's Pill daily—the most effective treatment of secondary anæmia. Ferrous better than Ferric salts.—B.M.A. Discussion.—L. ii./31,531. *Vide Ferri Subchloridum.*

Subacute combined degeneration of the cord successfully treated by Blaud's Pill 150 grains daily, in capsules. Liver treatment may be necessary in addition.—W. Sargant, L. i./32,232.

***Copper** as adjuvant to Iron, see Ferrous Chloride and Ferrous Sulphate.*

For the Estimation of Ferrous Carbonate and Effects on the Blood, see Vol. II.

Capsules of Blaud Pill equal to 5 grains of the pill are made.

Tablets, 4 and 8 grains. *Dose.*—1 to 4 four-grain, or 2 eight-grain Tablets, also made ℙ 1 4 gr. with Arsenious Acid $\frac{1}{64}$ gr. *Dose.*—1 to 4.

Capsules (5 grains) are also made in the following combinations: With Aloes, $\frac{1}{2}$, or 1 grain; ℙ 1 with Arsenic $\frac{1}{100}$, $\frac{1}{50}$, $\frac{1}{30}$ grain; with Cascara Extract, 3 grains; ℙ 1 with Nux Vomica Extract, $\frac{1}{4}$ grain; with Quinine Sulphate, 1 grain.

Ferri Citras. *Average dose.*—4 grains (**0·25 Gm.**).

Contains ferric citrate corresponding to not less than 16% metallic iron. Garnet red soluble scales with slight ferruginous taste.

Ferri et Ammonii Citras (*B.P.* '14). U.S. X.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). Yields 31% or 32% ferric oxide (*B.P.*'14). Contains 16 to 18% metallic iron (U.S.) Dark red scales soluble in about half their weight of water.

P. Off. A neutral compound. It should contain 7 to 8% Ammonium and 53—57% Citric radical ($C_6H_5O_7$). Aqueous solution has pH 7·5.

In debility and anæmia. Especially preferred in lingering cases of gastric catarrh after alkalis have ceased to benefit and the stomach is not ready for an acid tonic. Also with Sodium Salicylate in subacute rheumatism of children.

In ANÆMIA OF CHILDREN had no appreciable effect.—N. K. Gibbs, L. ii./29,550.

CHLOROSIS in young persons well treated by Iron. Chronic microcytic anæmia in mid-life treated by Ferric Ammonium Citrate, 60 to 120 grains daily for 4 to 5 months.—L. J. Witts, L. i./31,146. Ferrous salts in 4-grain doses may give results in 6 weeks.—Prof. J. A. Gunn, *ibid.* Prof. A. J. Clark, P.J. ii./32, and **Ferrous Chloride and Ferrous Sulphate.**

Simple achlorhydric anæmia treated by Iron and Ammonium Citrate. 90 grains daily increased to 120 grains.—D. C. Hare, B.M.J. ii./31,889.

Ferri et Ammonii Citras Viridis.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). Hypodermically $\frac{1}{2}$ grain in solution, but *for this purpose it must be neutralised.*

Sterules $\frac{1}{2}$ (**0·03 Gm.**, 1 grain (**0·06 Gm.**) and 2 grains (**0·12 Gm.**) in 1 Cc., also with Strychnine Hydrochloride $\frac{1}{60}$ grain (**0·001 Gm.**).

Ferri Hydroxidum cum Magnesii Oxido, *see* Antidotum Arsenici.

Ferri Subchloridum. *Syn.* FERROUS CHLORIDE, $FeCl_2 = 126·754$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) in Slipules.

May be prepared by heating Metallic Iron in dry Hydrogen Chloride White feathery crystals, very deliquescent.

Uses.—In anæmia in young females. It is probable that the Ferrous Iron is more active than Ferric—*See* Prof. A. J. Clark, P.J. ii./32, 2.

Ferrous Chloride, 2 grains (**0·12 Gm.**) and **Copper Sulphate** 1/120 grain (**0·0005 Gm.**) **Slipules.**

Dose.—One or two after meals daily, carefully increased if desired.

***Copper** as adjuvant to Iron.*

In ANÆMIA, experiments show that while pure uncontaminated Iron is ineffective, the addition of small amounts of Copper, Germanium, Nickel, Arsenic or Manganese make it effective—the results

being essentially the same with all the supplementary elements. A large number of other elements tried with negative results.—V. C. Myers and H. H. Beard, Jl.A.M.A. ii./29,1210. *See also* Prof. A. J. Clark, P.J. i./32, 511.

Copper is not contained in hæmoglobin but is a constituent in animal and vegetable cells. Copper should be given in conjunction with Iron.—E. Schiff Med. Welt., per B.M.J.E. i./31,82.

Idiopathic anæmia in women between 20 and 40 treated.—E. S. Mills, per M.A., '31,29.

✱**Endomin Tablets** (T.M. 506961).— A proprietary containing Iron 8 mgr., Copper 0·6 mgr., Manganese 0·4 mgr., Zinc 0·3 mgr., Nickel 0·3 mgr., Cobalt 0·03 mgr. and Sodium Germanate 0·005 mgr. *Dose.*—1 to 3 tablets thrice daily. For use in anæmia in conjunction with a palatable easily-digested diet, rich in Vitamins.

Ferri Perchloridum, *Syn.* FERRI SESQUICHLORIDUM, FERRUM SESQUICHLORATUM. $Fe_2Cl_6.12H_2O = 540·614$.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

Deliquescent yellow masses made by evaporating the stronger official solution and crystallizing.

Incompatible with infusions, etc., containing tannin, with the alkalis, alkaline carbonates, iodides, salicylates and mucilage of acacia. With Potassium Iodide in presence of Potassium Citrate a Potassium Ferricitrate is formed, and hence is compatible.

Uses.—A well-known tonic in ANÆMIA and RICKETS, has astringent action and is a useful styptic (it may be used in the solid form).

ERYSIPELAS.—Large doses of Iron Perchloride Tincture probably aid phagocytosis.—Whitla, Pract. Med. See also p. 414.

The Perchloride is the most diuretic preparation of Iron.—H.

Iron decreases the elimination of uric acid, which may account for the production of headache in rheumatic patients under its influence.—H. Its administration may bring on an attack of gout.—W. W. W.

GASTRIC ULCER has been treated by lavage with 100 Cc. of a solution of Ferric Chloride 1 in 1,000 repeated for 4 or 5 days, or as required.

T. H. orders for **Nebula Ferri Perchloridi,** 5 grains and Glycerin 15 minims: for **Pigmentum Ferri Perchloridi** 60 grains to 120 grains of this salt to each ounce of solution.

Glycerinum Ferri Perchloridi, G.H., has Ferric Chloride 1, Glycerin to 5. For use as a paint. Glycerin and Chloroform Water cover its metallic astringent taste.

Loëffler's Pigment for Diphtheria.

Menthol 10, Toluol *q.s.* to 36, Ferric Chloride Solution 4, Absolute Alcohol to 100. To apply on wadding every 3 hours. Painful in use. Dilute Hydrogen Peroxide is preferable.

'Collapsubes' with rectal tube contain Ferric Chloride 1 in 40 with soft paraffin basis for piles.

Gossypium Stypticum. *Syn.* GOSSYPIUM FERRI PERCHLORIDI. Saturate Absorbent Wool 85, with Water 100 containing Ferric Chloride 15 and dry. **Linteum Stypticum** is made similarly.

(In **Ph. Ned. IV.,** Gossypium Stypticum contained at least 2% Quinine Hydrochloride, and no iron.)

Liquor Ferri Perchloridi Fortis (*B.P.* '14). Contains 20% Fe. Has Sp. Gr. about 1·49. Its yield of Fe_2O_3 is 1·42 Gm. from 5 Cc.

Liquor Ferri Chloridi, U.S. X. Contains 10 to 11 Gm. Fe in 100 Gm.

Average dose.—1½ minims (**0·1 Cc.**).

Liquor Ferri Perchloridi (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Strong Solution of Ferric Chloride 1, Water to 4. Contains about 5% Fe.

Sp. Gr. and Iron content do not agree.—Y.B.P., '24,754.

SEPTICÆMIA has been treated by full doses of the liquor spread over 3 days.

RINGWORM treated with strong Ferric Chloride Solution. *Do not wash the head* during the treatment.—J. H. Garrett, B.M.J. i./13,390.

Liquor Ferri Sesquichlorati (Ferric Chloride Solution), P.G. VI. Contains 10% Iron approx. As in U.S., there is only one strength of this solution.

Tinctura Ferri Perchloridi (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 25% dilution of Strong Solution of Ferric Chloride with water, containing a proportion of Alcohol. (14·5 Gm. Anhydrous Ferric Chloride in 100 Cc. approx. U.S. about 13%.)

Flavoring.—Syl Aurantii Floris (double dose); Syrupus.

Owing to the fact that ferric chloride does not remove any of the acid of the gastric juice (as when reduced Iron or Blaud's Pills are given), this is preferred by many.

Thread-worms are killed by rectal injection of a drachm of the tincture in 10 ounces of water.

Angio-neurotic œdema has been treated with drachm doses repeated if necessary every 20 minutes.

Strumous children with tuberculous bone disease or enlarged glands have been treated with 5 to 10 minims, with 10 to 20 minims of solution of mercuric chloride *t.d.s.* given over long periods.

Cutaneous erysipelas. An old effective remedy is local application of Strong Solution of Ferric Chloride, also internal use of Tincture of Ferric Chloride.—E. T. Larkam, B.M.J. i./21,36.

For further uses see Ferri Perchloridum, antea.

Mistura Ferri Aperiens. U.C.H.

Magnesium sulphate 30 grains, ferrous sulphate 2 grains, diluted sulphuric acid 2 minims, peppermint water to 1 ounce. For the cure of inebriety.

℞ **Mistura Ferri Arsenicalis. U.C.H.**

Citrate of iron and ammonium 8 grains, Arsenical Solution 3 minims, infusion of calumba to 1 ounce. *Dose.*—½ to 1 ounce. R.O.H.—Iron and Ammonium Citrate 5 grains, Arsenical Solution 3 minims, Tincture of Calumba 10 minims, Water to 1 ounce.

Mistura Ferri Salina. U.C.H.

Potassium citrate 22 grains, solution of ferric chloride 24 minims, chloroform water to 1 ounce. The styptic taste of iron is masked in this mixture, as a double decomposition occurs between the iron and the potash salt.

Liquor Ferri Dialysatus (B.P. 1885).—Sp. Gr. 1·047.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Better tolerated than the strong acid preparations. Contains about 5% Ferric Oxide. To be prescribed as "drops," undiluted, or mixed with glycerin.

Glycerinum Ferri Dialysati.

Dialysed Iron Solution 1, Glycerin 2. Keeps well and is palatable.

Dose.—1 drachm (**4 Cc.**).

Dialysed iron is useful as an antidote to arsenic—much superior to the moist peroxide; 1 ounce doses should be given repeatedly, preceded by a dose of common salt or sodium bicarbonate.

Ferrum Oxydatum Saccharatum, P. Austr., P.G.VI., **Saccharated Ferric Oxide.** *Dose.*—10 to 40 grains (**0·6 to 2·5 Gm.**).

Dilute Ferric Chloride Solution (P.G.) 30 (by weight) with Water 150. Then add with stirring a solution of Sodium Carbonate 26 in Water 150 (towards the end of the precipitation before each fresh addition of the alkali one waits for the re-solution of the precipitate). Wash to free from Chloride, collect on cloth, press slightly, mix in porcelain dish with powdered Sugar 50 and so much Sodium Hydrate Solution (Sp. Gr. 1·17) as is required to dissolve on a water bath (not more than 5 to be used), evaporate and dry and mix with Sugar *q.s.* to make 100.

Liquor Ferri Pernitratis (*B.P.* 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

A reddish brown solution containing ferric nitrate $Fe_2(NO_3)_6 = 483·912$ Sp. Gr. 1·107, contains 3·3% Fe. *Uses* similar to those of the solution of the perchloride. For children in convalescence from prolonged chronic diarrhœa, 1 to 2 minim doses are useful.

Vinum Ferri, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Iron and Ammonium Citrate 4, Tincture of Sweet Orange Peel 6, Syrup 10, White Wine to 100.

Vinum Ferri Amarum, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Soluble Iron and Quinine Citrate 5, Tincture of Sweet Orange Peel 6, Syrup 30, White Wine to 100.

Organic Iron Compounds.

The hæmoglobin content of the blood is thought to increase by the use of some of these compounds.

Triferrin. *Syn.*—Ferri Nucleinas, Ferrinol.

Dose.—15 grains *per diem* after meals in divided doses.

An insoluble powder said to contain 21% of Iron and nearly 3% of Phosphorus. In anæmia and in phthisis.

Liquor Ferri Albuminati (after Dieterich).

Was in P. Jap 1907 slightly modified.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

P.G. VI. adjusts by analysis during process of making, so that the ultimate preparation contains 0·39 to 0·4% of iron. Ph. Ned. V. contains 0·25% Fe_2O_3. We give further data in Edn. XIX, p. 415.

Liquor Ferri Peptonati (after Dieterich; *Liquids to be weighed*).

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Dissolve dried egg albumen 10 in distilled water 1,000; add to this pepsin 0·5 and hydrochloric acid 14. Digest the mixture for 12 hours at 40° C. (104° F.) cool and neutralize with solution of soda; then add solution of chloroxide of iron 120 diluted with distilled water 1,000. Again neutralize exactly with diluted soda solution, collect, and wash, precipitate free from chloride.

Transfer to a tared bottle and dissolve in hydrochloric acid 1·17, warming slightly, add simple syrup 10, compound tincture of cinnamon 10, alcohol (90%) 150, and distilled water to 1,000. This solution is clear by transmitted light but opaque by reflected light.

Liquor Ferri Peptonati cum Quinina.

Dose.—1 to 4 drachms (**4 to 15 Cc.**)

Contains ½% of Quinine Hydrochloride.

Elixir Ferro-Manganesii Peptonati.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Contains, in addition to Iron, 0·1% of Manganese.

A useful and palatable hæmatinic.

Liquor Ferro Manganesii Peptonati cum Hæmoglobin (5 grains in the drachm)—suspended, will not dissolve to this extent.

Also **Liquor Iodo-Ferro-Manganesii Peptonati** [0·1% Iodine in combination ($\frac{1}{16}$ grain per drachm).] In anæmia and chlorosis.

Extractum Ferri Pomatum is prepared by digesting Iron Filings in juice of sour apples. That of P.G.VI. and P. Ital. V. contains 5% Iron.

Tinctura Ferri Pomata, P.G.VI.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Ferrated Extract of Apples 1 part, Cinnamon Water (P.G., containing 10% of alcohol) 9 parts.

Liquor Ferri-Acetatis (*B.P.* 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This solution does not decompose iodides. Pneumonia has been treated with full doses every six hours until crisis past.

Liquor Ferri et Ammonii Acetatis, U.S. BASHAM'S MIXTURE.

Average dose.—4 drachms (**15 Cc.**).

Tincture of Ferric Chloride 4, Dilute Acetic Acid 6, Solution of Ammonium Acetate 50, Aromatic Elixir 12, Glycerin 12, Water to 100. To be freshly made. Particularly useful in anæmia and chronic parenchymatous nephritis. It acts as a good diuretic and diaphoretic.—H.

Ferri Iodidum. FeI_2=309·704.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Crystalline brown hygroscopic masses readily soluble in water.

Manufacture.—It is best to employ a wet process, *e.g.*, to combine Iron 6 and Iodine 17 in water *q.s.*, filter and evaporate to dryness. By this method the iron is kept in excess.

Clean Iron Filings, previously washed with acid if oxidised, are preferable to iron wire. Mostly prescribed as one of the following:—

Syrupus Ferri Iodidi (*B.P.* '14).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Contains Anhydrous Ferrous Iodide 5% w/w approx. 10 Cc. contain 0·7 Gm. FeI_2. It contains 10% of Glucose. F. I. also requires same content of FeI_2. Ph. Ned. V. agrees.

P. BELG. IV. and F.E. VIII. have this strength as Concentrated Syrup which diluted 10 times provide 'Diluted Syrups' containing 0·5% Ferrous Iodide. P. ITAL. V. has the same dilute syrup only.

For suggestions re making and preservation of the Syrup, see Vol. II.

Incompatible with Sal Volatile and with Easton's Syrup—strychnine iodide, and perhaps quinine iodide are thrown out.

Capsules are prepared equivalent to 10 and to 30 minims.

Rheumatoid arthritis well treated.—H. W.

Exophthalmic goitre and rheumatoid arthritis have been treated with this and Arsenic, frequently with Guaiacum in addition.

The Syrup is liable to produce severe headaches.—K. Fraser, Cumberland, School M.O. Report, 1925.

When bronchitic cough is bad enough to waken child in the early morning, give 5 to 30 drops Syrup of Iodide of Iron in 1/3 to 1/2 glass of water, thrice daily just after meals, in warm weather. During the winter, these children, especially if under weight, are given instead the Pyrophosphate of Iron, ½ to 1 grain, in ½ to 1 teaspoonful of Cod Liver Oil.—M. Osthermer, Atlant. Med. Jl., per Jl. A.M.A. ii./25,635.

Dispensing Note.—Syrup of Iodide of Iron with Easton's Syrup mixed together precipitate in time, whether as such or diluted, but if both be made with glycerin they are compatible as such, but precipitate on dilution. But if a trace of hypophosphorous acid be added to the ordinary Syrup of Iodide of Iron they do not cause precipitation.

Liquor Ferri Iodidi. *Dose.*—4 to 8 minims (**0·25 to 0·5 Cc.**).

A solution for diluting 1 to 7 with Syrup to produce the above.

Suggested formula containing Hypophosphorous Acid (30%) 140 Cc. and Glycerin 100 Cc. per litre as preservatives.–G. M. Beringer.

Ferri Iodidum Saccharatum. U.S. 1890.

Dose.—2 to 15 grains (**0·12 to 1 Gm.**).

Combine Iron Wire 6, Iodine 17, in Water 20 : when complete, filter on to milk sugar 40, and Reduced Iron 1, previously mixed. Evaporate to dryness and add milk sugar, *q.s.* to 100. This and a similar preparation of P. Jap. IV. contain about 20% FeI_2.

Uses.—An exceedingly useful tonic, especially in arthritis, anæmia and phthisis. May be ordered in form of cachet.

Pilula Ferri Iodidi (**B.P.**, 1885).

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

Shake carefully in a stoppered bottle Iodine 80, Water 46, with Iron Wire 40; add decanted Solution to Sugar 70; mix and combine with Liquorice Powder 140. In dividing this into pills, roll them in a mixture of reduced iron and lycopodium, and varnish.

℞ **Pilula Garrodii** (Pilula Ferri Iodidi et Sodii Arsenatis E.G.A.)

Pill of Ferrous Iodide 2 grains, Exsiccated Sodium Arsenate $\frac{1}{36}$ grain, Extract of Belladonna $\frac{1}{12}$ grain.

Pilulæ Ioduri Ferrosi. *Syn.* PILDORAS DE BLANCARD, F.E. VIII., contain Iron 0·02 Gm. and Iodine 0·04 Gm., *i.e.* Iron in marked excess.

Syrupus Ferri Bromidi, B.P.C., 1901.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve sugar 14 ounces in Distilled Water 6 ounces; add Bromine 533 grains to Iron Wire, free from oxide, ½ ounce and water 4 ounces in a suitable vessel surrounded with cold water. Shake until the froth becomes white and the reaction is complete. Filter the solution into the warm syrup and add, if necessary, Water to produce one pint. Each drachm contains about 4½ grains of Ferrous Bromide.

Ferri Oxalas, $Fe(COO)_2.2H_2O$=179·8712. *Syn.*—FERROUS OXALATE, PROTOXALATE DE FER. **P. Belg. IV.** and **P. Hung.**

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellow crystalline powder, insoluble in water but soluble in dilute acids. Has been given in anæmia and as a nerve tonic.

Ferri Phosphas Saccharatus. **Saccharated Iron Phosphate** (*B.P.* '14).

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

An amorphous powder containing at least 60% of ferrous salts calculated as $Fe_3(PO_4)_2, 8H_2O$=501·6848.

Ferri Phosphas Solubilis, U.S.X. is a green soluble sodio-citro-ferric phosphate. Contains Ferric Phosphate equal to 12% Fe.

The following gives a green salt. Dilute Iron Persulphate solution 135 Gm. with water 300 Cc. Pour this rapidly, with constant stirring into Caustic Soda 50 Gm., dissolved in water 300 Cc. in a vessel of 2,000 Cc. capacity. Decant and wash thrice. Drain off most of the water and add the magma

gradually to Citric Acid 55½ Gm. and Sodium Phosphate 76 Gm. in just sufficient cold water to dissolve. Allow to stand 24 hours at about 60° C. to dissolve and filter. Concentrate at not exceeding 60° C. and scale without heat.—P.J. ii./09,405.

Ferri Pyrophsphas Solubilis, U.S. VIII.

Contains ferric pyrophosphate corresponding to not less than 10% metallic iron. *Average dose.*—4 grains.

Syrupus Ferri Phosphatis (*B.P* '14).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). One drachm contains 1 grain of anhydrous ferrous phosphate. Keep in bottles quite full.

Syrupus Ferri Phosphatis Compositus, B.P.C. *Syn.* CHEMICAL FOOD; PARRISH'S SYRUP (*modified*). *Dose.*—½ to 2 drachms.

The old formula was too acid, especially for children. The following we find preferable.

Dissolve Iron 0·43 in Concentrated Phosphoric Acid 5·625 (66·3%) with equal vol. of Distilled Water and heat in plugged glass vessel. Cool, filter, and pass Orange Flower Water 5 through the same filter. Boil Cochineal 0·34 in Distilled Water 37·5 for 15 minutes. Filter and wash with Distilled Water to 35, in which dissolve Sugar 70 with heat. Strain through flannel and make up to 105 by weight. Add while hot the Iron solution, and then with brisk stirring and in small amounts add Precipitated Calcium Carbonate 1·29, Potassium Bicarbonate 0·10 and Sodium Bicarbonate 0·10 in about 15 of Distilled Water *in small amounts at a time* and shaking well. Add no more til purple colour which sometimes appears has gone. Make up with Distilled Water to 100 by volume and stir. Allow to stand for 12 hours. Syphon off clear liquor and strain through flannel.—A. C. Abraham, P.J. i./31,438.

The Cochineal should be used whole. Some favour Cudbear.

P. Off.—A similar form, using Sodium Phosphate 1%.

For estimation of Iron and Calcium in this Syrup, see Vol. II.

Capsules of Chemical Food are each equivalent to 1 drachm.

Ⓟ **Syrupus Ferri Phosphatis cum Quinina et Strychnina** (*B.P.*'14)

Syn. EASTON'S SYRUP, SYRUPUS TRIUM PHOSPHATUM.—G. H.

Dose.—½ to 1 drachm (**2 to 4 Cc.**)—One drachm represents 1 grain of anhydrous ferrous phosphate, ⅕ grain Quinine Sulphate and $\frac{1}{3\cdot2}$ grain Strychnine. Sp. Gr. approx. 1·290. The percentage of Strychnine in the syrup is 0·057 w/v, equivalent to 0·044% w/w for Sp. Gr. 1·29.

A new formula. Less acid than the B.P. and keeps better. Iron wire 8·6 Gm., Phosphoric Acid Conc. 42·5 Cc., Hypophosphorous Acid 40 Cc., Strychnine 0·57 Gm., Quinine Sulphate 14·8 Gm., Syrup 666·6 Cc., Distilled water to 1,000 Cc. The Hypophosphorous Acid is added to the solution of Iron and the alkaloids before filtering into the syrup.—J. H. Franklin, P.J. i./27,55.

Easton's Syrup was dismissed from the U.S.P.

Flavoring.—Syl Aurantii Amari. Extractum Glycyrrhizæ Liquidum covers, but not so good as Syl Aurantii Amari.

Uses.—Easton's Syrup is a well-known tonic preparation. It improves the coagulability of the blood.

Ⓟ **Liquor pro Syrupo Eastoni.** 3 with 7 of Simple Syrup= **Easton's Syrup** (*i.e.*, 144 minims with Simple Syrup *q.s.* to 1 ounce).

Add to a Solution of Ferrous Phosphate 5 ounces (produced by dissolving Iron Wire 150 grains in Phosphoric Acid, Sp. Gr. 1·5, 2¼ ounces and water *q.s.* to 5 ounces), **Liquor Eastoni sine Ferro** 7 ounces (made by dissolving Strychnine 10 grains and Quinine Sulphate 26 grains in Phosphoric Acid warmed, 2 drachms and adding water *q.*

to 7 ounces). Is better recently prepared. The Solution of Ferrous Phosphate keeps for a moderate time in stoppered bottles, which should be as full as possible to prevent exposure to the air.

Easton's Syrup and Syrupus Ferri Phosphatis B.P. increase in Specific Gravity on keeping, owing to inversion of the sugar.—C. M. Caines and N. Evers, P.J. ii./25,139. *See also* P.J. i./26,168.

Both Easton's Syrup and Chemical Food may throw down Ferric Phosphate. Easton's Syrup is also liable to deposit Quinine Phosphate.—L. B. Timmis and N. Evers, P.J. ii./26,180.

Liquor Eastoni sine Ferro.—Some protracted experiments by us showed that this Liquor can be kept almost colourless by using Sulphurous Acid (5%) in proportion of 1 minim in 3 ounces. This is better than Hypophosphorous Acid, which has been used by some. The bottle must be kept stoppered, *i.e.*, air must not have access to the Liquor.

Hypophosphorous Acid and Sulphurous Acid must not be used together.

Easton's Syrup in Two Syrups.

(*a*) Mix Liquor Ferri Phosphatis 5 with Syrup *q.s.* to 20.

(*b*) Mix Liquor Eastoni sine Ferro 7 with Syrup *q.s.* to 20.

These keep well separately. Mix at time of dispensing.

℗ **Syrupus Triplex.** Understood to mean a mixture of equal parts of Easton's, Fellows' and Parish's Syrups. **Edin. Royal Infirmary** has 1, 1 and 2 respectively.

Physicians should specify in prescribing which formula is intended

℗ **Elixir Ferri Phosphatis cum Quinina et Strychnina.**—*Martindale.* *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

The same strength as the B.P. '14 Easton's Syrup. Prepared with Simple Elixir ('94) in place of Syrup as a vehicle.

Easton's syrup has its equivalent dose in the following pill, which is portable, tasteless, and readily soluble :—

℞ **Pilula Ferri Quininæ et Strychninæ Phosphatum.** Easton's Pills.—*Martindale.*

Contain Ferrous Phosphate and Quinine Sulphate of each 1 grain (**0·06 Gm.**), Strychnine $\frac{1}{32}$ grain (**0·002 Gm.**), Milk Sugar $1\frac{1}{4}$ grains (**0·08 Gm.**), Concentrated Phosphoric Acid *q.s.*

Mix quickly, having first triturated the Strychnine with the Milk Sugar, and prepare the pills. Finally varnish with Sandarach Varnish. Also made one-half this strength. Either may be combined ℞ with Arsenious Acid, $\frac{1}{60}$ grain (**0·001 Gm.**).

℗ **Glyceritum Ferri, Quininæ et Strychninæ Phosphatum.** **U.S. VIII.** *Syn.*—**Glycerole-Easton.**

A substitute for the syrup for administration where sugar is not desirable. It keeps better than the syrup and is palatable.

Average dose.—15 minims (**1 Cc.**) containing approximately Soluble Ferric Phosphate $1\frac{1}{4}$ grain (**0·08 Gm.**), Quinine as Phosphate $1\frac{1}{2}$ grain (**0·1 Gm.**), Strychnine base $\frac{1}{60}$th grain (**0·001 Gm.**).

℞ **Tablets of Easton's Syrup** are each equivalent to $\frac{1}{2}$ and 1 drachm of the syrup. (Sugar coated).

℞ **Capsules** equivalent to $\frac{1}{2}$ and 1 drachm of Easton's syrup are also prepared and each **combined ℞ with Arsenic $\frac{1}{50}$ grain.**

℞ **Pilula Trium Phosphatum, G.H.** Is similar to our Formula for Easton's Pills.

Ferri Sulphas (*B.P.* '14). $FeSO_4,7H_2O=278{\cdot}0092$. **Ferrous Sulphate**
Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In clear, pale, bluish green crystals, soluble 1 in 1½ of water.

A saturated solution with some crystals of the salt in excess keeps better than a weak solution, in the latter oxidation soon takes place.

Flavoring.—Glycerin or Syrup.

Relieves anæmia more thoroughly than carbonate or phosphate.—CHLOROSIS IN YOUNG FEMALES well treated by Ferrous Salts in 4-grain doses. May give results in six weeks.—Prof. J. A. Gunn, L. i./31,146. *See also* Ferrous Chloride.

Copper as adjuvant to Iron. *Suggested dose.*—1/120 grain of Copper Sulphate, —*c.f.* **Ferrous Chloride and Copper Sulphate Slipules**, p. 412.

1% solution of Ferrous Sulphate prevented development of ankylostoma ova and all died in 24 hours.—L. i./10,355.

Ferri Sulphas Exsiccatus (*B.P.* '14). U.S. X., P. Jap. IV.
Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**). 5 grains=8 of the preceding.

Best administered in pill, as :—

Pilula Ferri Sulphatis 3 or 5 grains, with syrup *q.s.* Dissolving slowly, these pills do not derange the stomach. If made with lanolin or kaolin ointment as excipient will not crack.

Mistura Ferri Cathartica R.O.H.
Dose.—1 ounce.
Ferrous Sulphate 1 grain, Magnesium Sulphate 30 grains, Dilute Sulphuric Acid 5 minims, Water to 1 ounce.

Liquor Ferri Subsulphatis, U.S. IX. Monsel's Solution.
Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

A solution of basic ferric sulphate. When evaporated and scaled forms **Monsel's Salt** or **Ferric Subsulphate** $Fe_4O(SO_4)_5$. *Dose*—½ to 2 grains (**0·03 to 0·12 Gm.**).

A spray of 20 grains to the ounce checks hæmoptysis, and internally is not irritating although astringent.

Unguentum Ferri Persulphatis.—Ferric Sulphate 10 grains, Almond Oil ½ drachm, Conium Ointment to 1 ounce.—Prov. Hosp. (General Hosp., Notts.).

The name Persulphate may be taken to mean normal **Ferric Sulphate** $Fe_2(SO_4)_3$ as contained in Liquor Ferri Tersulphatis, U.S.

Ferri et Magnesii Sulphas. $FeSO_4MgSO_4,6H_2O=380{\cdot}3736$.
Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

Green crystals, soluble 3 in 4 of water.

In 10 grain doses has no astringent or aperient action, hence suitable for prolonged use in chlorosis and anæmia.

Ferri et Manganesii Citras.
Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

In reddish scales, freely soluble in water. Useful in chlorosis combining the action of the two elements.

Ferro-Alumen, Iron Alum.—*Syn.* FERRIC AMMONIUM SULPHATE
$Fe_2(SO_4)_3.(NH_4)_2SO_4.24H_2O=964{\cdot}3728$.
Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). Amethyst coloured efflorescent crystals, of astringent taste. ***Soluble*** 1 in 3 of water (bes

with a little sulphuric acid added), insoluble in alcohol. Internally to arrest hæmorrhage, also as an astringent gargle (2%), throat spray or pigment.

Ferri et Potassii Tartras (*B.P.* '14). FERRUM TARTARATUM.
Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).
Reddish brown scales soluble in water about 1 in 1.
Menorrhagia of young females is well treated by this tartrate.
For mucous disease, this or the Ammonio-Citrate is given with alkali in Calumba Infusion.

Tinctura Ferri Tartarata.—Ferrous Sulphate 8, Potassium Bitartrate 4, Distilled Water 30. Digest 24 hours in a covered vessel, then add Alcohol 68% 70, stand one hour and filter.

Ferri et Ammonii Tartras U.S. VIII. *Average Dose.*—4 grains. Contains not less than 13% metallic iron.

Molybdenum (Mo=96·0). This metal is found chiefly as its Sulphide **Molybdenite** MoS_2. It is employed for hardening steel. Unlike ordinary Carbon Steel, Molybdenum Steel has the property of retaining its temper even when heated to a high degree, hence cutting tools made with it are able to make deep cuts at high speed—the steel may in fact be heated to dull redness without impairing its quality. Molybdenum has Sp. Gr. 8·6.

FILIX MAS.

The rhizome of *Dryopteris* (*Aspidium*) *Filix-mas.* The Male Fern.

Extractum Filicis Liquidum (*B.P.* '14).
Dose.—45 to 90 minims (**3 to 6 Cc.**).
Prepared by ether extraction—the yield being about 9 to 10%.
It contains (*B.P.* '14) not less than 20% of **Filicin**, the anhydride of Filicic Acid, stated to be inactive as a vermifuge. *Vide* p. 422.
P. ITAL. V, 20 to 28% Crude Filicin, F.E. VIII, 24 to 25%, P. BELG. IV, 24%.
Oleoresina Aspidii, U.S. is also made by ether percolation.
Average Single Dose.—30 grains (**2 Gm.**) once a day.
Assay and methods for detecting adulteration of, vide Vol. II.

Flavoring.—The taste of this preparation is horrible. Best prescribed as capsule, or if in a draught, it is best ordered with Mistura Amygdalæ, with a little Essential Oil, *e.g.*, Cinnamon.

Uses.—For all varieties of tapeworm and *ankylostomum duodenale*. May be administered fasting and should be preceded and followed by a brisk purgative.

The following routine has been successful in obstinate cases. Light food at tea-time—purgative at bedtime (Magnesium Sulphate and Jalap suitable), purgative again in morning, after action give vermifuge. Liquid Extract of Male Fern 1 drachm, Mucilage of Acacia 1 drachm, Cinnamon Water to 1 ounce. After passage of the worm give Castor Oil to remove remaining vermifuge from the bowel, N.B.—We do not consider Castor Oil ideal for the purpose. At any rate, it is not advised *before* or *with* a Filix Mas preparation.

In a most stubborn case of *T. Solium*, of which we have information (1927), the method was, however, ineffectual, as also were Infusion of Kousso and Pelletierine Tannate.

For a slight modification of the method, *see* L. ii./27,766.

Capsules contain 15 minims (1 Cc.) of Liquid Extract. *Dose.*—1 to 4. Yeo mentions Capsules of 7½ minims of Male Fern Extract with 1 grain of Calomel, sixteen for a dose—two every ten minutes.

Male Fern Extract (40 minims in an ounce of milk flavoured with Peppermint Oil, 2 minims) must be given on an *empty* stomach. An aperient, Magnesium Sulphate or Sodium Sulphate, should be taken first in a good quantity of water (8 to 10 ounces).—B.M.J. i./17,624.

We learn from Dr. Wakeman that the tapeworm is rife in Abyssinia. The natives drink cold infusions of Kousso, but this seldom brings away the head of the worm. They much prefer Male Fern capsules when they can get them—these act effectively, especially when followed by 1 to 2 drachms Compound Jalap Powder.

Two preliminary doses of Sodium Sulphate at 5 and 8 p.m. on the previous day and a water enema in the morning. Then an emulsion of Extract of Filix Mas and Infusion of Senna in Gum Arabic through a duodenal tube. Dose of Filix Mas, 6 Cc. for adult to 2 Cc. for child of 5½.—B.M.J.E. ii./29,62.

TAPEWORM.—When all other methods fail, the following (known as the '**early bird**') is often successful: Pumpkin Seed 8 Gm., Kousso 4 Gm., Pomegranate 4 Gm., made in an infusion, to which is added Kamala 4 Gm., Oleoresin of Aspidium 4 Gm., Glycerin 15 Cc., Mucilage of Acacia 15 Cc., Water to 240 Cc. Give in two draughts 2 hours apart, after usual preliminary treatment. Severe gastro-enteric irritation with vertigo and prostration may result, but it usually gets the worm. Or give by duodenal tube into an empty stomach the morning after a day's preparation with milk diet and a cathartic, half a dose of a Senna Infusion (5 in 100), and 15 minutes later 2 Gm. of Oleoresin of Aspidium and 4 Gm. of Extract of Pomegranate Seed mixed with the other half of the Senna Infusion. Remove tube promptly. Whole worm expelled in ½ to 2 hours. No treatment of any kind for tapeworm should be repeated at a less interval than three months.—Jl. A.M.A. ii./28,585.

TUBERCULOUS CONDITIONS are stated to have benefited under treatment with ether-alcohol extract of fresh plant. Children to receive ¾ grain, adults 1½ grains, in pills, twice daily for 10 to 15 consecutive days each month.

Dangers of Filix Mas. Moderate doses almost invariably produce bilirubinæmia and in large doses jaundice. There is risk of chronic cirrhosis of the liver developing.—O. Hannsen, L. ii./22,1188.

Toxicology of Filix Mas. A case seriously affected.—L. i./11,109.

Poisoning from use of Male Fern Extract in Castor Oil—the case was actually Addison's disease and not parasitic infection.—B.M.J.E. i./15,44.

About 100 cases of serious impairment of vision have been reported following administration of Filix Mas, mostly in South Germany and Switzerland.—Per Jl. Trop. Med., April 15, '25,168.

Haustus Filicis Maris, L.H. Liquid Extract of Male Fern, 1 drachm; Syrup of Ginger, 1 drachm; Tincture of Quillaia, ½ drachm; Peppermint Water to 1 ounce.

Mistura Filicis, U.C.H. *Dose.*—1 ounce.

Liquid Extract of Male Fern 1 drachm, Powdered Acacia 1 drachm, Chloroform Water to 1 ounce.

Filicin and other Principles of Male Fern.

Great confusion exists, relative to the chemistry and clinical results, with the constituents of the rhizome.

The statement is generally made that the anhydride body **Filicin**, on which the Liquid Extract *B.P.* '14 and the Oleoresina Aspidii U.S. are assayed, is inactive.

The *dose* of Filicin, if given, may be stated as from 5 to 15 grains.

In our recent personal knowledge, in a single case, it was not a tænicide, the 'filicin' having been specially made in our Laboratory

on the lines of *B.P.* '14 method. Tænia cases are often *exceedingly obstinate* and the following, from the *Presse Medical* is of interest.

"Filicin" prepared by triturating the ethereal extract of Filix Mas with 10 times its weight of Magnesia. The liquid is filtered off and rejected. The Magnesia compound is treated with water and filtered and Hydrochloric Acid added to this: the resulting precipitate, which is dissolved in Ether and then dried, is "Filicin" this is, of course, simply a modification of the usual assay method). It is soluble in Ether, slightly in Alcohol, but insoluble in water. It is a combination of various acid bodies. Given by the mouth in large doses, it causes vomiting and diarrhœa. It is eliminated by the bile. An investigation on flatworms and tapeworms showed it to be an excellent helminthicide: the ingested Filicin reaches the intestine, impregnates the tænia, passes into the blood and then into the bile and returns to the intestines, where it again acts on the parasites—this cycle being repeated many times. The drug is given in pills or capsules (in oil solution) in 12-grain doses for adults, and to children ¾ grain for each year of age. There are no toxic effects if given in suitable doses. Tænia are stated to be expelled in a few hours. Combined with Calomel, both an anthelmintic and purgative action is obtained. —B.M.J.E. i./27,20.

The view has been stated that a compound termed **Filmaron**, a parent substance of 'Filicic Acid,' is the active one, present to the extent of 5% in the rhizome. This is a proprietary article of which there is little knowledge. It is noteworthy that the P.G. assay process for '**Filmaronöl**' simply determines Filicin in the oil on the lines of the B.P. assay. Some comparative clinical data would be of great value.

A preparation termed **Danistol**, for use in liver fluke (*Syn.* liver rot, Distomiasis) in sheep, etc., is stated to contain a derivative of Male Lern (of the formula $C_{44}H_{50}O_{15}$), in capsule form. They contain *Benzol* as solvent and a further variety contains Carbon Tetrachloride as solvent. We have worked on the veterinary side of the issue as well, and have knowledge (1927-8) of the utility of a capsule of Filicin in Benzol in the affection named, but by far the best results were obtained from a capsule containing a filicin in the form of liquid extract *with* a *small* dose of Carbon Tetrachloride.

Filicic Acid, in conclusion, is sometimes spoken of. It is best to ignore the name. Filicin as above defined may be supplied for it.

Aspidinofilicinum Oleo Solutum P.G. VI. *Syn.* Aspidinolfilizinöl, Filmaronöl, is a 10% solution in a neutral vegetable oil.

For further data re Assay and Adulteration vide Vol II.

Other tæniacides are **Kamala** (discarded from B.P.), the glandular red powder attached to the capsule of *Rottlera tinctoria*; *Mallotus Philippinensis* (*Euphorbiaceæ*); this may be given in dose of 30 to 120 grains suspended in water: **Cowhage, Dolichos pubes**, the hairs adhering to the pod of *Dolichos* or *Mucuna pruriens* (*Leguminosæ*), *dose* 1 or 2 grain in treacle or honey: **Papain**, and **Thymol Carbonate**, *q.v.*, but an efficient tæniacide is **Pelletierine Tannate**, *q.v.*, *cf. also Carbon Tetrachloride and Oleum Chenopodii.*

GELATINUM.

Nearly colourless transparent sheets or shreds made by extracting animal tissues, bones, etc., with boiling water.

Skin Gelatin is the best. It is more pliable and possesses more 'fibre' and is suitable for gelatin capsule making. Bone gelatins made from **Osseine** (acidulated bone) are brittle and hence unsuited.

Dose.—Ad libitum *per os*, and injected.

Gelatin taken *per os* is most easy of digestion, the cleavage products being largely absorbed. It is first converted by pepsin into proteoses and peptones. Trypsin of the pancreatic juice then splits these into amino acid.

Sterules of Concentrated Saline Gelatin Solution are prepared for injection into the gluteal region as a hæmostatic; each makes a 2% solution on dilution with boiled water to ***5 ounces***—sufficient for one injection at 103° F. Injections of this amount are made every third day in the flank or buttock, up to 30 or 40 injections.

These constitute the great standby in treatment of hæmoptysis of tuberculosis.—English's System of Treatment, vol. i., 1154.

G. W. Davis (L. Sept. 8, 1900) gave 6 ounce subcutaneous injections of 1% Gelatin with Cerebos Salt 0·3% for hæmorrhage.

The solution is sometimes used stronger, *e.g.*, 10%,—*i.e.*, the contents of the Sterule diluted to 1 *ounce* (30 Cc.).

Gelatina Soluta Sterilisata, P. Helv. Is 10% in Normal Saline. The utmost precautionary directions are given, including animal experiments to exclude organisms of malignant œdema and tetanus.

Liquor Gelatinæ Sterilisatus, P. Jap. IV. is similar, but strength of Sodium Chloride 0·5%. The Solution is neutralised with Sodium Carbonate and filled into hard glass tubes containing 10 to 40 Cc. sealed and sterilised thrice each time for 15 minutes at 24 hour intervals. The name of the laboratory and volume of contents to be given on each tube.

Soluté de Gélatine Injectable.—Fr. Cx. Supp. Nouv. 1926. Substitutes the formula on p. 668 of Fr. Cx.

Official Gelatin 10 Gm., Sodium Chloride 8 Gm., Distilled Water to 1,000 Cc. Neutralise to Litmus accurately by adding drop by drop N/10 Sodium Hydroxide. Sterilise for 15 minutes at 115° C. in an autoclave.

Uses.—To check bleeding from the lungs, from the intestines in typhoid and dysentery, from the bladder and from the stomach in ulcer and cancer of that organ. These injections may be followed by pain, fever, local swellings and nettle rash. Other hæmostatics may be combined with it.

Aortic aneurism is relieved by subcutaneous injection of the solution.

Secondary hæmorrhage well treated. Blood which ordinarily coagulates in 7 minutes clots in 3 minutes after an injection. Dose is about **5 Gm.** in a 1% solution. Very useful in cases of ruptured tubal pregnancy.—L. ii./08,1782.

Intrathoracic aneurysm. The solution advised by Lancereaux in 1904 consists of Gelatin 25, Sodium Chloride 7, in Water 1,000 (=2·5%). He injects 200 Gm. at a time and repeats every 4 or 5 days. Sir J. K. Fowler begins with 50 Cc. of 2% Solution and gradually increases to 100 Cc. and 4% respectively. Guthrie Rankin says the relief of pain is striking.—F. De Havilland Hall.

For visceral pains and for speeding up healing process: 5 or 10 Cc. of 5% solution injected. Aneurysm (60 cases) well treated with 100 Cc. 2% solution weekly.—Per Jl. A.M.A. i./26,519.

It is the most powerful *protein-sparer* known, being able to save from destruction half its weight of protein or twice as much as is spared by an equal quantity of carbohydrate. 1 Gm. yields about 4·1 Calories.—R. Hutchison.

For GASTRIC ULCER gelatin is very easily digestible. A diet of gelatin, fat and sugar has been advised. It 'fixes' a great deal of acid.

Intestinal bleeding has been arrested by administration by the mouth.

SNAKE BITE: Oozing hæmorrhage due to this occurs from all mucous membrane; well treated by large quantities of 5% Gelatin Solution *per os*.—B.M.J. i./15,632.

Gelatinothorax.

Treatment of empyema thoracis by intrapleural injection of antiseptics. **'Sterules' of Concentrated Gelatin Saline** diluted with 9 ounces of boiled water, produce ***10 ounces*** of a 2% solution, the contents of one **Euflavine 'Sterule'** (1 grain) being added at the time of dilution (=1 in 5000 or 2 grains to produce 1 in 2,500). **Sterules of the Gelatin Solution** are also made to produce ***2 ounces*** of 2% on dilution. An initial injection of 5 or 10 Cc. *only* is given to test response. Should be tried before siphonage, suction drainage, or operation.—J Crocket, B.M.J. i./31, 684; L.i/31, 758. *See also* R. A. Hunter, Tubercle, Feb., 1931.

Gelatin Solution 5 to 10% containing 5% Calcium Chloride.

To arrest hæmorrhage.—*Vide* **Calcii Chloridum.**

Formalised Gelatin.—This has been used with success as a substitute for Collodions. Gelatin Solution 10% in water is stored in wide mouth test tubes holding three ounces each. The tubes are plugged with cotton wool and sterilised at 100° C. for 15 minutes on three successive days. When required for use melt in a water bath and add 1 drachm of Formalin Solution diluted 10 times, *i.e.*, 4% strength of Formaldehyde approx.—the final product will then contain a little over 1% of Formaldehyde (H.COH) or fully 2½% of Commercial Formalin.

The wound is dressed with a thick roll or pad of sterilised gauze, with a piece of stiff gauze above extending beyond the wound. The Formalised Gelatin is applied with a swab on the top of the stiff gauze beyond the limit of the wound—this holds the dressing in place without bandage.—Communicated by the Dispenser, General Infirmary, Leeds.

For **Formalised Gelatin Capsules** *vide* Formagules.

***Vernisol** (T.M. 221492).—A water-soluble varnish, or jelly which dries and leaves a transparent, flexible coating, non-irritating, and may be medicated with the usual dermatological agents.

GELSEMII RADIX. (*B.P.* '14), U.S. IX.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). *N.B.*—U.S. IX. gave ½ grain only as average dose.

The dried rhizome and roots of "yellow jasmine"—*Gelsemium nitidum* (*Loganiaceæ*) (*G. sempervirens*, Aiton) (*Loganiaceæ*) imported from the United States. Must be distinguished from the yellow jasmine cultivated here, which is a species of *Jasminum*.

Uses.—Febrifuge, anti-spasmodic and analgesic. In acute and rheumatic neuralgia, toothache, uterine and ovarian pain and chorea. It is a powerful paralyser, as well as tetanizer, and respiratory poison. Large doses contract the pupil and cause giddiness and diplopia.

The plant contains at least two alkaloids, one designated **Gelseminine** (crystalline), which is highly toxic, and the other Gelsemine, which is of little importance.

Antidotes.—Emetics, Atropine or Strychnine hypodermically, Nitroglycerin or Amyl Nitrite; artificial respiration, stimulants.

Accidental death from an overdose in the case of a woman suffering from neurasthenia.—P.J. i./27,558.

℞ **Gelseminina.** $C_{22}H_{26}N_2O_3$=366·2188.

This base is called by some '*Gelsemine*,' causing confusion.

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**).

Yellowish-white minute crystals, M.Pt. 160° C., with a bitterish taste, sparingly soluble in water, easily in alcohol, ether and acids. It forms crystalline salts, and has mydriatic properties.

℞ **Gelsemininæ Hydrochloridum.** $C_{22}H_{26}N_2O_3.HCl$ (?)=402·6838.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In white, granular crystals, freely soluble in water.

Ⓟ **Extractum Gelsemii Pulvis.** *Syn.* GELSEMIN (EXTRACTIVE)—*avoid this name.* *Dose.*—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in a pill with spirit and glycerin.

The powdered alcoholic extractive (resinoid) of a pale brown colour.

Ⓟ **Extractum Gelsemii Liquidum.** By percolation with a mixture of Alcohol 4 and Water 1. Strength 1=1. *Average dose*—$\frac{1}{2}$ minim.

Dysmenorrhœa is well treated by 3 minims doses with 5 minims of Tincture of Belladonna thrice daily.

For examination nervousness a small dose thrice daily is a tonic.

Ⓟ **Tinctura Gelsemii** (*B.P.* '14).

Gelsemium in No. 40 powder 2, Alcohol (60%), *q.s.* to 20. Percolate. The tincture is fluorescent.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often combined with Bromide of Ammonium or Potassium for neuralgia.

Flavoring.—Syl Anethi, Syl Rosæ; Syrupus Aurantii.

Uses.—For neuralgia of face and jaws associated with carious teeth—15 minims of the tincture every 6 hours may relieve.

Neuralgia has been treated by $\frac{1}{2}$ drachm doses thrice daily for two months. Disordered vision may follow even moderate doses.

In rheumatoid arthritis it is given with Cimicifuga *q.v.*

INFLUENZA well treated by the following:—

Gelsemium Tincture 12 minims, Belladonna Tincture 5 minims, Potassium Citrate 10 grains, Syrup of Orange 1 drachm, Chloroform Water to 1 oz. *Dose.*—1 ounce every four hours. Afterwards $\frac{1}{2}$ oz. until temperature falls to normal. Headache and backache vanish, with general improvement. The only disadvantage is that Gelsemium may cause ocular disturbance.—W. D. D. Small and W. O. Blanchard, B.M.J. i./19,241.

Mistura Gelsemii R.O.H.

Dose.—1 ounce.

Gelsemium Tincture 10 minims, Aspirin 10 grains, Sodium Salicylate 10 grains, Potassium Bromide 10 grains, Sodium Bicarbonate 10 grains, Chloroform Water to 1 ounce. For neuralgia and generally as sedative.

GLUCOSUM.

Syn. DEXTROSE, GRAPE SUGAR. $C_6H_{12}O_6 = 180{\cdot}0936$.

Liquid Glucose occurs as a viscous mass containing about 20% moisture and of Sp. Gr. 1·6 approx. It is prepared by acting on Starch with Dilute Hydrochloric Acid. **Pure Dextrose** is an equilibrium mixture of α and β Dextrose in white 'granular' powder. **Solid Glucose** less pure in yellowish masses containing 10 to 20% of bodies allied to Dextrin, viz., Amylin and Gallisin.

Saccharum Amylaceum P.G. VI. White crystals or powder. A 10% solution with 1 drop of Ammonia of the substance dried at 105° C. has a Specific Rotation of + 52·5° at 20° C., using Sodium light.

Glucose Officinal—FR. CX. Nouv. Supp. (1926) is pure anhydrous *d*-Glucose—a white crystalline powder, with M.pt. 146° C. Two varieties are described *d*-Glucose α, got by crystallisation at 30 to 35° C., and *d*-Glucose β, by evaporating at 110° C. In solution one form is changed into the other, with resulting equilibrium. A Monohydrate (110 Gm. of which equals 100 Gm. of anhydrous) also exists and is permitted.

GLUCOSE of commerce (Liquid) is of two kinds, **'Crystal'** and **'Neutral.'** 'Crystal' is the neutral variety bleached with Sulphites. It is 'water-white' and contains up to 7 grains Sulphur Dioxide per lb. The neutral is of pale yellow colour and is usually free from traces of Sulphur Dioxide. Its flavour is superior to the crystal variety. It has approximately a quarter the sweetness of refined sugar and it is not so good a preservative. Analyses of Crystal Glucose showed Dextrose 34 to 48%, Dextrin 30 to 45%, Sulphur Dioxide free and combined 0·03 to 0·1%, Moisture 14 to 20%.—H. H. Robins, C.D., Mar. 31, '17.

If Cotton Wool is treated with Sulphuric Acid one vol. and water three vols. a viscous solution is produced which becomes later as fluid as water. From this Glucose is obtained.—C. T. Cross, C.D. i./17,252.

Glucose is now largely used *per os*, *per rectum*, subcutaneously and intravenously for artificial feeding as a preliminary to severe operations and for wasting diseases.

It is usual at a well-known London nursing home to permit patients to eat Barley Sugar (85% Glucose) *ad. lib.* (1 lb. or more) before operations to prevent acidosis.

Glucose Lozenges are available weighing 4 Gm. and containing each Glucose 3 Gm.

The following notes are arranged as far as possible under the headings ***Glucose Feeding*** (*per os*). ***Glucose Injections and Rectal Feeding.*** Glucose as sclerosing agent for varicose veins and some remarks on the sugar as a surgical dressing are added.

Glucose Feeding.

ACETONURIA.—A heaped teaspoonful in half a teacup of cold water repeated every 2 hours for 4 or 5 doses, appears to give relief in practically all cases. 99% of cases of vomiting at sea are accompanied by increased acidity and acetonuria.—M. Fawkes, B.M.J. i./25,241.

Persons suffering from sea-sickness, air-sickness, cyclic vomiting, car-sickness, migraine, asthma and acute gout, nearly always suffer from acetonuria and are relieved by massive doses of Glucose.—M. Fawkes, B.M.J. ii./29,1133.

ACUTE INFECTIONS AND CASES OF UNDER-NUTRITION.—Glucose, ½ to 1 lb. daily with food of distinct benefit. (Normal persons can assimilate 200 to 500 Gm. in one dose without glycosuria.)—T. Izod Bennett and E. C. Dodds, L. i./25,429. Cane Sugar used similarly, good in typhoid and febrile diseases. —J. A. Ryle, *ibid.* 515.

ASTHMA IN CHILDREN: Glucose for prevention and treatment. Sugar as such, not as starch, prevented recurrence in four cases. Thought to be of no value in adults apparently. Also of value in infantile eczema.—A. A. Osman, L. ii./29,1187. (See, however, p. 1283.)

CARDIAC FAILURE.—1 drachm doses of 5% solution *per os* apparently saved life.—G. Scott MacGregor, B.M.J. i./21,158; see also S. E. Denyer, *ibid.* 248.

Plenty of sugar for the school child. Instinct a good guide.—A. A. Osman, B.M.J. i./31,223.

Glucose Injections.

Barrington-Ward's Abdominal Surgery of Children advises a full diet and a bottle of barley sugar the day before the operation and more on the morning of the operation. When operation is severe and resistance low 5% glucose subcutaneously. Older children 10% per rectum.

As a Summary. Always *before* a severe operation, (1) when liver efficiency is suspected, (2) when the metabolic rate is high, (3) when patient is under-nourished or emaciated: always *after* a severe operation when blood transfusion is impossible: *after* any anæsthetic (1) where loss of blood has been heavy and blood transfusion is impracticable, (2) in case of shock, (3) where it has not been given before the anæsthetic, (4) where a rough surgeon has operated, or more than the usual amount of anæsthetic used, (5) where there is a history of epilepsy.—F. P. de Caux, B.M.J. ii./29,1005.—(10% solution is preferred by this writer, given at 100° F.)

Glucose Sterules were suggested by A. E. Barker, and can be carried about for serious operations. The contents of one, diluted to a pint with boiled water, makes a 5% solution (***isotonic with the blood***). A litre of this solution may be injected, and only causes evidence of sugar in the urine after repeated injections and only to the extent of 2 to 3% of the quantity given. An aspirator needle about 1 mm. in section and 3 feet of tubing with a glass reservoir above is all the apparatus required. The needle is introduced under the skin in the region of the axilla—the douche is raised 2 feet or so and transfusion proceeds. The treatment is good as regards pulse, general strength and relief of thirst. By this means, water, the first need, is given in large amount with safety, and sugar to the extent of 2 ounces per diem without any demand upon the alimentary tract. Increased action of the kidneys is caused and diluted toxic matters are removed.

The solution is also used *intravenously* with the addition at the time of dilution of 4 to 8 drops of Adrenalin Solution.

Glucose Sterules have been used in prevention of post-operative shock, toxæmias of pregnancy, acute and chronic enteritis in infants, cancer, stricture of the pylorus, chronic ulcer, severe neurasthenia, and anuria or oliguria. In toxic affections such as appendicitis, bronchopneumonia, and typhoid, the solution has been given per rectum.

Soluté de Glucose Hypertonique Injectable.—FR. CX., Nouv. Supp., '26. Official Glucose 300 Gm., Distilled Water to 1,000 Cc.

Soluté de Glucose Isotonique Injectable.—FR. CX., Nouv. Supp., '26, is 5% Isotonic Solution, sterilised at 110° C. in neutral glass.

When a dehydrating effect is required hypertonic solutions are given intravenously or per rectum, as if given subcutaneously such solutions may cause œdema.

Intramuscularly a 10% solution in Saline is relatively safe for raising blood sugar and when other methods contraindicated. 20 to 40 Cc. for infants: 100 Cc. for older children or adults. The maximum rise in blood sugar occurs in ½ hour.—J. Glaser, Jl. A.M.A. ii./28,726.

The adult body can utilise only 0·8 Gm. per kilo weight per hour. If given too rapidly is promptly excreted through the kidneys and wasted.—Jl. A.M.A. ii./29,1327.

Intravenously for adults, 75 Gm. in 300 Cc. of water has been advised; given during 1½ hours.—L. ii./29,723. Less, it is stated, will not give the maximum therapeutic effect, and more may produce over-stimulation of the Insulin-producing activity of the pancreas. Single repeated doses preferable to prolonged injection. Half dose for a child and quarter dose for infant, but same length of time for injection.—P. Titus and H. D. Lightbody, per Jl. A.M.A. ii./29,947.

Bright's Disease with scanty urine. Contents of a sterule diluted with a pint of distilled water intravenously—effect most satisfactory.—Major G. W. Vincent, Maymyo, Burma, Oct. 4, '25.

Arthritis, Chronic.—Glucose tolerance in. A lowered glucose tolerance is present in a large proportion of cases.—G. L. Kerr Pringle and S. Miller, L. i./23,171.

From 20 to 60, or even 100 Cc. 10% Glucose into the painful areas of the muscle and subcutaneous tissues gives immediate relief of pain in muscular rheumatism and lumbago. Also used with success in sciatica, etc.—B.M.J.E. ii./31,8.

Diabetes, Severe, treated, especially in cases where acidosis threatened.—Sir W. H. Willcox, B.M.J. ii./21,706.

Gastric Ulcer has been treated by giving nothing, not even water by the mouth, and supplying 3 or 4 pints daily of Saline Sugar Solution—the method gives the ulcer every chance of healing. Secondary parotitis may, however, occur, special care is hence necessary to use antiseptic mouth washes. The method should be valuable in treating ailments in which natural feeding is difficult, *e.g.*, in the hyperemesis in pregnancy and in cholera.

Jaundice.—Intravenous injection of 500 Cc. of a 10% Glucose solution may be indicated two or three times a day to rehabilitated patients with abnormally functioning livers. In jaundice, intravenous injections of 5 Cc. of a 10% solution of Calcium Chloride help to hasten coagulation of blood, prevent post-operative bleeding and neutralise the toxic bile pigments.—W. Walters and W. J. Mayo, Jl. A.M.A. ii./25,885.

Œdema, Threatened, of the Lung and collapse averted by intravenous injection of 20 Cc. 50% solution.—B.M.J.E. i./16,11.

Perforation of the Stomach and Duodenum.—The injections help to raise vascular tension lowered by sweating, vomiting and toxæmia.—A. E. Barker, B.M.J. i./13,106.

Pneumonia.—The heart can be best helped by giving it food and oxygen. The best food is sugar. Intravenous injections of 10% Glucose are perhaps the most valuable when circulatory failing has commenced.—W. H. Wynn, L. ii./22,496.

Pregnancy.—Glucose intravenously 5 to 10%, 4,000 Cc. in 24 hours.—B.M.J.E. ii./30,64. *See also Vomiting of Pregnancy postea.*

Septicæmia.—Continuous giving of Glucose, up to 3 litres a day, drop by drop into the tissue of the breast, or into the saphenous vein, of great value in severe cases.—Sir W. Wheeler, L. ii./31,245.

Toxæmia with gastric stasis well treated by intravenous injections of 10 Gm. (1%) Sodium Chloride, and 100 Gm. Glucose (10%), in 1,000 Cc. freshly distilled sterile water. Twenty minutes allowed for injection, 1, 2 or 3 litres being injected daily, supplemented by hypodermoclysis and proctoclysis —Per Jl. A.M.A. ii./25,637.

Vomiting of Pregnancy.—Glucose injections useful.—V. J. Harding and B. P. Watson, L. ii./22,649.

Intravenous injections of 50 to 75 Gm. of Glucose in 200 to 300 Cc. distilled water (25% solution) used. The addition to the injection of 1 unit of Insulin to 5 to 10 Gm. Glucose did not seem to have any clinical advantages. Vomiting usually ceased in 12—24 hours.—P. Titus, Jl. A.M.A. ii./25,491. W. Thalhimer gives 100 Gm. of Glucose intravenously in as much water as the condition of the patient indicates (1 or 2 litres), the injection taking from 3 to 5 hours, and administers *hypodermically* 1 unit of Insulin for every 3 Gm. of Glucose. Vomiting usually ceased in 6 to 8 hours.—*Ibid.* 493.

POST-ANÆSTHETIC VOMITING, to abolish.—More extensive use intravenously desirable.—R. J. Clausen, B.M.J. ii./31,377.

Rectal Feeding.

Absorption of Dextrose (5% solution in Saline Solution when so given) is proved by the way it raises respiratory quotient and abolishes or diminishes acidosis; on the other hand protein absorption is either nil or exceedingly minute—the salts in foods of this kind are absorbed and probably produce what good is done—there is indeed no place in therapeutics for nutrient enemata containing protein and fat.—B.M.J. i./11,872.

DELAYED CHLOROFORM POISONING treated by rectal injection of Sodium Bicarbonate. Also Glucose Solution ½ ounce in ½ pint of Milk by nasal tube and a 10% solution by the rectum four-hourly, in addition to a good supply of Carbohydrate food. Improvement nothing short of marvellous, and recovery perfect.—L. ii./09,710.

CYCLIC OR RECURRENT VOMITING.—All food should be withheld from the stomach and rectal feeding substituted. Glucose should be added to the Normal Saline for rectal use not only as food, but because the adequate use of fat requires co-operation of active Carbohydrate metabolism.—P.R.S.M., Diseases of Children Sect., Feb., '10,85.

Varicose Veins.

A mixture of 50% Glucose and 30% Sodium Chloride thought to be the ideal solution. *Dose.*—2 to 10 Cc.—not more than 20 Cc. at one sitting, with injections every other day.—H. M. Kern and L. W. Angle, Jl. A.M.A. ii./29,601.

A 50% solution found the blandest and most efficient method of sclerosing. Inject 5 to 10 Cc. and then again 3 to 4 cm. higher: repeat bi-weekly.—G. de Takats, Jl. A.M.A. i./29,778.

Up to 5 Cc. of 66% solution. There is a tendency for the clot to break up, and of the recorded instances of pulmonary embolism from varicose vein injections, the majority have occurred with Glucose.—W. Levi, L. ii./30,16.

Glucose is not greatly favoured in this country. It is not safe as regards embolism, nor will it prevent necrosis if there is an escape.

Glucose as Surgical Dressing.—The wound is dusted with powdered glucose and covered with strips of protective silk, having been first cleaned with tampons soaked in hot boiled water. May be painful. In some cases antiseptics may be wanted before the glucose. The sugar acts as a nutrient to the tissues. Also used as MOIST DRESSING.—L. i./13,651.

ULCERS dressed with 40% Glucose; also to replace the Liquid Paraffin in B.I.P.P.—B.M.J. ii./18,574.

Bromidrosis, ozæna, otorrhœa treated by swabbing with 25% Glucose solution. Chronic vaginal discharge treated by 25% Glucose Pessaries in gelatin basis.—T. H. C. Benians, B.M.J. i./18,669.

For Estimation of Glucose in Urine, *see* Vol. II.

Dextrin (P. Helv.).—Yellowish powder or gum-like masses. Is obtained commercially by heating starch to 200° C. According to P.G.I. it is made by heating potato Starch 150, with Oxalic Acid 4 in water 750 with frequent stirring until a little of the mixture no longer gives blue with Iodine. Dextrin takes up some Iodine without colouring. It is necessary to first saturate the liquid with the Iodine and then add a slight excess to get the coloration. Neutralise with calcium carbonate and evaporate the filtered liquor. Consists principally (there are various other dextrins formed before this) of Achroodextrin which is the ultimate product of starch hydrolysis before the grape sugar stage is reached.

GLYCERINUM.

$C_3H_5(OH)_3$=92·0624.

Dose.—1 to 2 drachms (4 to 8 Cc.).

Intravenously, 1 drachm (4 Cc.) has been given with equal amount of tap water.—J. T. Shirlaw (*v. postea.*)

Manufactured by decomposing fats with alkali or superheated steam. Sp. Gr. 1·260. ***Soluble*** in alcohol and water in all proportions, but immiscible with Ether or Chloroform.

Ph. Ned. V. permits 11·7 to 13·6% Water. Sp. Gr. 1·230-5.

CASTOR-SEED FERMENT (LIPASE) method of splitting up oils and fats is a satisfactory one for Glycerin production. It is easy to conduct, but the Glycerin is very crude.—C.D. July 10, '20,978.

The Germans when short of fat, increased production of Glycerin by yeast fermentation of sugar in alkaline medium in presence of Sodium Sulphite. Glycerin formed to extent of 36%. Americans produced it by fermenting molasses in presence of Sodium Carbonate.—B.M.J. i./22,115.

Glycerin distillation, historical, etc.—F. C. C. Robb, P.J. i./21,256.

Thousands of tons are used p.a. to prevent freezing in motor-car radiators.

CRYSTALLISATION of Glycerin occurs occasionally in the cold weather. It seems to have been first observed in 1866 and reported that year at the Paris Exhibition under Napoleon III. The melting point is 17° C.—C.D.

Uses.—Internally tends to relax the bowels. Is added to cough mixtures and to relieve forms of indigestion with gaseous distension. As an enema, ½ ounce alone or with ⅓ water added relieves constipation, and it reduces piles. Externally 1 with 2 or 3 of water prevents cracks of chilblains and forms an ingredient in a large number of skin applications. It is a useful solvent for many active principles of drugs, standing midway between alcohol and water, *cf.* **Glycetracta.** It is also a valuable preservative, *cf.* " Aqueous " Tinctures.

For burns, soak cotton wool in it and cover with oiled silk.

As a throat pigment, and for uterine application, Glycerin of Tannic Acid may be used double (*B.P.* '14) strength—1 in 2½ of Glycerin—**Pigmentum Acidi Tannici,** Glycerinum Acidi Tannici being 1 in 5.

Cancer.—Metabolism of tumours.

J. T. Shirlaw states that cancer frequently develops in people who have previously suffered from ***glycosuria of the non-pancreatic type,*** but he has ' yet to come across a patient with true pancreatic diabetes developing cancer.' In the non-pancreatic type the only explanation for the non-combustion of the sugar is that the fatty acids are not sufficiently unsaturated by the liver ferments and lipase. Combustion of fats and carbohydrate is therefore incomplete, causing superabundance of fatty acids with possible formation of ***saponins,*** which owing to their solvent action on the lecithin and cholesterin of the cell are extremely irritating, and the alteration of surface tension produced has a profound influence on the division of cells. ***Glycerin injected intravenously (1 drachm in 1 drachm of boiled tap water)*** thought to combine with fatty acids and form innocuous fat. A case of scirrhus of the breast so treated showed considerable improvement. Small quantities of ***tin also*** act ***as catalyst*** and ***assist synthesis of Glycerin*** and fatty acids into fat and ***2 Cc. Stannoxyl intramuscularly*** were given simultaneously with the Glycerin injection.—B.M.J. i./31,74.

A combination of this kind (glycerin plus fatty acids) is hastened by the presence of Caustic Potash and by *Tin.* (An appreciable amount of Olein is formed from Oleic Acid and aqueous Glycerol by action of pancreatic Lipase.—J. T. Shirlaw, Biochem. Jl., 1930, Vol. 24, No. 5.)

Germicidal Action of Glycerin.

In strong concentrations in culture media Glycerin acts as a deterrent to growth, the inhibition being of a hindering nature rather than bactericidal. Organisms possess different degrees of resistance to contact with Glycerin, the gonococcus and streptococcus being the most fragile. In the case of the *strepto coccus*. Glycerin exerts its power after 6 hours and bactericidal power after 8 hours' contact (in the case of gonococcus the times were ½ and 1 hour). Vastly superior to Potassium Permanganate for antiseptic and surgical use when dealing with an organism like the staphylococcus. Valuable results by intrauterine injections in ***septic conditions of the uterus and its appendages.***—A. Compton, L. ii./26,326-28. (*v. postea.*)

Glycerin when diluted to about 50% is an efficient germicide and rendered possible the introduction of **Glycerinated Lymph.** It killed Staphylococci, Streptococci, Tubercle bacilli, diphtheria and enteric. The only organisms resistant to 40% Glycerin longer than a month were spores of the hay bacillus, spores of *B. mesentericus vulgatus*, the common pink yeast, and *B. coli.*, when kept in the cold.—S. Monckton Copeman, B.M.J. i./31,513.

Glycerin as surgical dressing.

BOILS AND CARBUNCLES, and all kinds of wounds and sores, effectually treated, covered by gutta-percha tissue or oiled cambric. Also good in eczema. Absence of bleaching and maceration of the skin.—D. Kyle, B.M.J. i./31,76.

Glycerin 25% to 30% in wet Boric Lint dressing. Effect possibly biochemical.—D. Kyle, B.M.J. i./31,425.

CELLULITIS.—Glycerin in combination with Liq. Hyd. Perchlor. excellent for all kinds of.—H. A. Morton Whitby, B.M.J. i./31,206.

LYMPHANGITIS well treated with Glycerin and Ichthyol.—H. W. Webber, B.M.J. i./31,206.

SEPTIC WOUNDS on fingers well treated with Glycerin and Ichthyol.—H. W. Webber, B.M.J. i./31,206.

Tuberculous peritonitis treated by Glycerin 1 pint intraperitoneally—in desperate cases beneficial but toxic.—A. MacLennan. Probably diluted just as good.—D. Kyle, B.M.J. i./31,76.

Hygroscopic action of Glycerin is the essence of its success. Use in preference as the B.P. Glycerole 1 in 5 to kill the germs. When drawn out of the lymphatics by the Glycerin they are killed in a pool of Carbolic Acid.—A. Ogier Ward, B.M.J. i./31,118.

Tuberculous abscess cavities injected with Glycerin after evacuation of contents and cauterising with Iodised Phenol.—H. A. Morton-Whitby, B.M.J. i./31,206.

RECENT WOUNDS as arriving in Casualty Dept. at a London Hospital treated with a mixture of Glycerin 1, Liquid Glucose 6 and Water 3—left on 3 days, then a dry dressing with Boric Acid Powder. Also effective in bromidrosis. Fetor prevented and in ozœna (with Glucose).—T. H. C. Benians, B.M.J. i./31,285. For osmotic action by Glycerin in conjunction with Ichthyol has also been used.

Billroth (1877) said Glycerin is a good disinfectant poured freely on wounds.—A. Hayes Smith, B.M.J. i./31,336.

VARICOSE VEINS. Intravenous injections of 5 to 10 Cc. 50% Glycerin and Water initially, and 6 days later one or two injections of a 75% mixture. All cases successful.—F. Maignon, per Pres., Jan., '32,34.

Glycerin in Labour.

LYMPHAGOGUE ACTION OF a 10% Solution of Tincture of Iodine in Glycerin. The Iodine helps to stimulate uterine contraction.—H. J. Phillips, L. ii./25,1229,1307 ; Proc. Roy. Soc. Med., Feb. '26,26.

In obstetrics Glycerin is useful, (*a*) where puerperal sepsis is a possibility, and (*b*) mild sapræmia or definite septicæmia.—C. Elliott, L. i./29,1057.

Glycerin in midwifery advocated. It is powerfully hygroscopic, inhibits bacterial growth, particularly the Cocci and Coli groups, the

causal organisms of puerperal sepsis, reduces œdema, and encourages healing of lacerated tissues. Soothing to hæmorrhoids. Used as routine at every confinement.—R. Mackinnon, B.M.J. ii./30,980.

A viscous hygroscopic fluid like Glycerin, containing an antiseptic, used during labour, would diminish chance of infection from without and from the vagina. Experiments showed that Phenol is 2½ to 3 times less potent in Glycerin than in water (W.H.M.). Lord Moynihan suggested Acriflavine. Continuous administration of ***Calcium salts from commencement of pregnancy to end of the puerperium*** advised to build up resistance—15 grains of Calcium Phosphate in ½ ounce of water thrice daily.—J. L. Moir, B.M.J. ii./30,1066; i./31,118.

Acriflavine Tablets (1·75 grains are prepared. One in 4 ozs. of Glycerin previously heated to 110° C. and cooled makes 1 in 1,000 solution for vaginal injection. The solution is non-irritant and highly toxic to pathological bacteria including the gonococcus. Calcium Therapy is *the* prophylactic for eclampsia. —J. L Moir, *ibid.*

Glycerin and Acriflavine (1 in 500) for torn perineum.—P. G. Preston, B.M.J. i./31,294.

Carbolised Glycerin as an injection in labour, might be of value in preventing puerperal infection. The exact proportion of the antiseptic in the Glycerin is however open to discussion, viz.: (1) The strength must not be sufficient to injure the membranes or cause shock. (2) Glycerin may weaken the antiseptic potency of Phenol. (3) Glycerin in itself is antiseptic, and (4) its physical qualities are ideal for the purpose.

We confirmed (1929) that the bacterial efficiency of Phenol in Glycerin is actually less than in an aqueous solution. A suitable strength appears to be 1%. Stronger solutions would introduce a considerable element of risk.

As a further suggestion, ***Thymol in Glycerin*** would be worth trying, but its smarting effect is pronounced, though no doubt transient.

Glauramine in Glycerin 1 in 60 suggested in midwifery, especially when frequent examinations needed and in prolonged or difficult labour. No irritation.—F. H. Lacey, B.M.J. i./31,36.

Puerperal Sepsis. ***Glycerin Irrigation*** up (to 200 Cc. once or thrice daily into the uterine cavity or cervical canal) the most effective remedy at our disposal, but should be used at an early stage. Pyrexia as a sign for puerperal sepsis an entirely unreliable guide—it rarely develops at the outset; pulse rate of more importance. Drainage by Glycerin started as soon as temperature rises to 99° or pulse rate to 90. It is *not* normal for a woman to suffer from after-pains for the first few days after the puerperium and pain is invariably due to interference with free drainage. Profuse lochial discharge another indication for early treatment.—A. R. Hobbs, B.M.J. ii./31,746.

Glycerinum Boracis (*B.P.* '14) is not a mere solution; it has an acid reaction and when mixed with an alkaline carbonate evolves Carbonic Acid; useful in infantile diarrhœa, in 20 minim doses.

Glycerinum Aluminis (*B.P.* '14). An astringent in chronic pharyngitis; is less disagreeable than tannin.

Gargarisma Aluminis—U.C.H. 2% in Acid Infusion of Roses; C.H.W. 5 grains with Tincture of Myrrh 40 minims to ounce.

Glycerin Jelly, for toilet use.

Gelatin 140 grains, Rose Water 6 ounces; soak a few minutes and heat in a water-bath to dissolve; add, when cool but still fluid, White of Egg ¾ ounce. Heat to coagulate completely, and add Glycerin 6 ounces, Salicylic Acid 12 grains. Mix well, filter through a hot-water funnel, and bottle while warm.

Lubricant Glycerin Jelly. Is somewhat softer than the latter. For toilet use and lubrication of Stomach Tubes.

Glycerinum Aluminis et Acidi Tannici.

Potassium Alum (free from iron), in powder, 1, Glycerin 6. Heat to dissolve, and add Tannic Acid 1. An astringent throat pigment. Diluted 1 in 20 as a vaginal injection.

Glycerinum cum Aqua Rosæ.

Glycerin 2, Rose Water 3. An agreeable emollient for the skin.

Lotio pro manibus.—Vic. Park.

Tragacanth Powder 1 ounce, Alcohol 90% 1 pint, Glycerin of Borax 2 ounces, Tincture of Benzoin 1 ounce, Thymol 5 grains, Oil of Lavender and Cochineal, Rose Water to 4 pints.

Glycero-alcohol. *Syn.* PETIT'S LIQUOR.

Dose.—5 to 60 minims (**0·3 to 4 Cc.**).

Glycerin 333, Distilled Water 146, Alcohol 95% 580. Is used as a solvent of alkaloids and active principles. It has Sp. Gr. about 1.

Glyco-gelatin, T.H.

Gelatin 1 ounce, Glycerin (by weight) $2\frac{1}{2}$ ounces, Orange Flower Water $2\frac{1}{2}$ ounces. Soak the Gelatin in the water, then heat till dissolved and add the Glycerin. When nearly cold add carmine solution, *q.s.*

Gelatinum Glycerinatum, U.S. Soak Gelatin 1 for one hour in sufficient previously boiled and cooled water to cover it. Drain and add Glycerin 1, heat until dissolved, strain hot, and evaporate to 2 by weight.

Glyco-Gelatid Pastilles (*Soft*) The following weigh 20 grains:—

	Acidi Borici ..	gr. 2
	Acidi Carbolici ..	gr. $\frac{1}{2}$
	Acidi Citrici ..	gr. $\frac{1}{2}$
	Ol. Limonis ..	m. $\frac{1}{4}$
	Ammonii Bromidi	gr. 1
Ⓟ	Apomorphinæ ..	gr. $\frac{1}{3\,2}$
Ⓟ	Codeinæ	gr. $\frac{1}{1\,0}$
	Bismuthi Carb. ..	gr. 3
Ⓟ	Bismuthi Carb., T. H.	gr. 3
Ⓟ	Morphinæ Acet. ..	gr. $\frac{1}{4\,0}$
	Cascara Sagrada ..	gr. $2\frac{1}{2}$
𝔇 ℙ1	Cocæ Extracti ..	gr. $2\frac{1}{2}$
𝔇 ℙ1	Cocainæ HCl. gr. $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{1\,0}$, $\frac{1}{1\,2}$, $\frac{1}{2\,0}$ (T.H. has $\frac{1}{1\,0}$.)	
𝔇 ℙ1	Cocainæ ..	gr. $\frac{1}{1\,5}$
𝔇 ℙ1	Morphinæ ..	gr. $\frac{1}{3\,0}$
Ⓟ	Codeinæ	gr. $\frac{1}{8}$
	Convallariæ Tinct.	m. 2
	Eucalypti Olei ..	m. $\frac{1}{2}$
𝔇 ℙ1	Eucalypti Olei ..	m. $\frac{1}{2}$
𝔇 ℙ1	Cocainæ HCl. ..	gr. $\frac{1}{2\,0}$
𝔇 ℙ1	Heroin	gr. $\frac{1}{2\,4}$
	Menthol, T.H. .. (St. Th. H. gr. $\frac{1}{4}$)	gr. $\frac{1}{6}$
𝔇 ℙ1	Menthol. ..	gr. $\frac{1}{2\,0}$
𝔇 ℙ1	Cocainæ HCl. ..	gr. $\frac{1}{2\,0}$
Ⓟ	Menthol	gr. $\frac{1}{2\,0}$
Ⓟ	Codeinæ	gr. $\frac{1}{1\,0}$
	Menthol	gr. $\frac{1}{2\,0}$
	Eucalypti Olei ..	m. $\frac{1}{2}$
Ⓟ	Morphinæ Acet. ..	gr. $\frac{1}{3\,0}$
Ⓟ	Pini Pumil. Olei. ..	m. $\frac{1}{2}$
𝔇	Terpeni Hydratis.	gr. $\frac{1}{8}$
𝔇	Heroin HCl. ..	gr. $\frac{1}{6\,0}$
	Sulphur Præcip. ..	gr. 5
	Potassii Tart. Acid.	gr. 1
	Terebeni	m. 2
	Thymol	gr. $\frac{1}{3\,2}$
𝔇 ℙ1	Tussis=Cocainæ ..	gr. $\frac{1}{1\,5}$
	et Morphinæ ..	gr. $\frac{1}{3\,0}$

The **Pastils** or **Jujubes,** oval or round shape, are in the index under Trochisci 'G' (*i.e.*, of Gum).

Marshmallow Pastils, PASTILLES DE GUIMAUVE.

Boil incised Marsh Mallow Root 100 in Water 400, strain off the liquor. Evaporate to about 80 and mix with Tragacanth 10 and Sugar 1,000, adding Orange Flower Water 10 or more if necessary to make a mass for cutting into Pastils weighing 20 grains (1·2 Gm.). This basis may be medicated with throat remedies similar to those given under Glyco-gelatin Pastils.

Suppositoria Glycerini (*B.P.* '14). Gelatin 14, Glycerin by weight 70. Water *q.s.* to 100, suitably combined. Pour into moulds of 15, 30, 60, or 120 minims or other capacities as required. Contain 70% by weight of Glycerin. This basis may be used for gelatin **pessaries.**

U.S. orders Glycerin 80, Monohydrated Sodium Carbonate 2, Stearic Acid 8, Water 10, in Gm. for 30.

Vaginal Suppositories, U.S., are globular or oviform in shape and weigh about 10 Gm. if made with Glycerinated Gelatin, and 4 Gm. if with Theobroma Oil, *v.* also **Ovules.**

Glycerin Tampons consist of gauze and wool swabs soaked in Glycerin medicated with Ichthyol 5 and 10%, with Izal 4%, also Resorcin 1 and 2%. S. H. has Ichthamol 5, 10 and 20%.

Hollow Suppositories, composed of Oil of Theobroma. May be filled with 20, 45, or 90 grains of Glycerin; they are prompt in action.

Hollow Suppositories and **Pessaries** may also be filled with **Bismuth** and **Cocaine Ointment, Gall** and **Opium Ointment, Liquid Extract** of **Hamamelis, Hamamelis Ointment, Adrenalin Solution.**

Cataplasma Kaolini, U.S. VIII·—Kaolin 577, Boric Acid 45, Thymol 0·5, Methyl Salicylate 2, Peppermint Oil 0·5, Glycerin 375 (all by weight). Heat the Kaolin one hour on a water bath and add the rest. **Cataplasma Salicylicum Compositum, ✱ Antiphlogistine** (T.M. 253831), **✱ Sorbefacin** (T.M. 303921), and **Thermofuge** are used to relieve inflammations.

PELVIC CELLULITIS OR PERITONITIS IN LABOUR. Hot tampons of Cataplasm Kaolin with 5% Ext. Bellad. Virid., with hot vaginal douches, useful.—R. Kelson Ford, B.M.J. ii./30,727.

Unguentum Glycerini Compositum, St. Th. H.

Glycerin 3 drachms, Strong Solution of Lead Subacetate 20 minims, Wool Fat 3 drachms, Lavender Oil 1 minim, Soft Paraffin to 1 ounce.

Glycerin Substitutes. (Used during the war.) (See Edn. XIX.)

Ethylene Glycol $CH_2OH.CH_2OH$. is used as a substitute for Alcohol as a solvent and preservative.

It is non-excisable, non-toxic, non-inflammable, and non-corrosive to metals. Used as an ' anti-freeze ' and as an ingredient in dynamite, also as menstruum and solvent for preparing fruit essences and flavouring essences : a good solvent for terpeneless oils. Superior to Glycerin as preservative. May be safely given to animals in doses up to 20 Cc. per kilo daily.—C.D. ii./26,438 ; *ibid.* 428.

As a solvent or vehicle for medicinal products it is comparatively innocuous. Intramuscular injections well tolerated in man (M.L.D. in rabbits 6·6 Gm. per kilo). It is said that even 140 Cc. would be needed to cause toxic symptoms in man and the fatal dose would be more than ½ lb.—P. J. Hanzlik and Co-workers, Jl. Pharm. and Exp. Therap., April, '31,406. W. F. von Oettingen and E. A. Jirouch, *ibid.* Aug. '31,371, draw however other conclusions and say subcutaneously likely to cause irritation. Large doses may cause severe gastro-enteritis.

GLYCETRACTA (GLYCETRACTS).

Strength.—1=1 of Drug.

Dose.—The equivalent in volume to the dose of the drug, excepting those standardised, *v. postea.* For doses see the Index.

Glycerin is a good solvent and preservative for medicinal substances. As Marshall remarks, " Substances which are soluble in water and insoluble in alcohol are to some extent soluble in glycerin." It should be noted that, as a general rule, glycerin extracts must contain at least 25% of glycerin to preserve them.

"Glycetracts," first described by us, C.D. i./08,489, have the advantage of miscibility with aqueous vehicles (those of alkaloidal drugs made with a necessary small addition of acid would be incompatible with alkalis). Many are suited both for internal and local use; they keep well, are cheap, and being free from alcohol, are convenient and suitable for export.

The following Glycetracts are perfectly miscible with water:—

- P1 Glycetract of belladonna.
- Glycetract of calumba.
- Glycetract of cascara.
- Glycetract of chiretta.
- (P) Glycetract of conium.
- (P) Glycetract of digitalis.
- (P) Glycetract of gelsemium.
- Glycetract of gentian.
- Glycetract of hamamelis.
- (P) Glycetract of hyoscyamus.
- (P) Glycetract of jaborandi (almost).
- Glycetract of quassia.
- Glycetract of sarsaparilla.
- Glycetract of squill.
- Glycetract of senega.
- Glycetract of senna.
- Glycetract of taraxacum.
- Glycetract of valerian.

The following can be rendered miscible, as stated later:—

- P1 Glycetract of aconite.
- Glycetract of catechu.
- Glycetract of cinchona.
- 回 P1 Glycetract of coca.
- (P) Glycetract of colchicum.
- P1 Glycetract of ergot.
- (P) Glycetract of hydrastis.
- Glycetract of krameria.
- Glycetract of rhubarb.
- (P) Glycetract of Virginian prune.

Method of Preparation.

1. For Drugs containing water - soluble constituents, bitters, tannin principles, and some flavouring agents:—

(*a*) *Percolation-process.*—For those drugs which will percolate satisfactorily, without "blocking," this method is to be preferred. Macerate 100 of the drug in No. 20 powder in glycerin 50 and water 200 for twenty-four hours, then commence percolation. Reserve the first 50 of percolate and continue percolation with chloroform-water (1 in 1,000) until exhausted. Evaporate the liquor to 50 and add to the reserved portion.

Experiments show that this percolation method is suitable for calumba, cascara (1% of strong solution of ammonia to be added), digitalis (for an alcoholic form see Edn. XIX. p. 432), gentian, hamamelis leaves, krameria, rhubarb, sarsaparilla, senega, taraxacum, valerian and Virginian prune bark. Glycetract of Virginian prune is made without heat.

(*b*) *Maceration-process—i.e.*, for drugs which will not percolate satisfactorily. Macerate crushed drug 100 in a hot mixture of glycerin 50 and water 200 for six hours, press off, and repeat maceration with hot water twice. Combine liquors and evaporate to 100.

Experiments show that this is suitable for chiretta, liquorice (cold maceration), quassia, senna (cold maceration), squills (cold maceration).

2. Alkaloidal Drugs.

For drugs containing alkaloids percolate the crushed drug 100, with a mixture of glycerin 50, acetic acid 9, and water 191, and proceed otherwise as under 1 (*a*), making the final product 100 containing about 3 per cent. of acetic acid.

This method our experiments show to be applicable for aconite, belladonna, cinchona, colchicum, conium, ergot, gelsemium, hydrastis, hyoscyamus, ipecacuanha and jaborandi. A larger proportion of acid does not yield larger alkaloidal contents.

The acetic glycerin mixture extracts the bulk of the alkaloids in most cases. (Beringer used Tartaric Acid 2%, except for Colchicum, Conium and Ipecacuanha, in which Acetic Acid was used.)

"Glycetracts" which do not mix *clear* with water can be replaced by an aqueous extractive, evaporating and mixing a sufficiency of glycerin with the warm liquor, but alkaloidal drugs must be handled by the method 2.

The following **Glycetracta** are standardised :—

Glycetract.	Alkaloidal Strength.	Dose.
P1 Aconite	0·4 % Alkaloids	(Average) 1 min.
P1 Belladonna ...	0·375 ,,	1 to 2 min.
Cinchona	3·0 ,,	8 to 25 min.
P1 Coca	0·25 ,,	1 to 2 dr.
(P) Colchicum (seeds)	0·5 ,,	(Average) 3 min.
(P) Conium (seeds) ...	0·45 ,,	(Average) 3 min.
(P) Digitalis	M.L.D. 0·1 Cc. per 100 Gm. frog	1 to 2 minims.
(P) Hyoscyamus ...	0·075% Alkaloids	(Average) 3 min.
(P) Ipecacuanha ...	1·1 ,,	Expectorant 1 to 4 min. Emetic 30 to 40 min.
P1 *Nux vomica ...	0·75% Strychnine	2 to 6 min.

*This Glycetract is best made with Hydrochloric Acid—the strength employed is 5 Cc. of Hydrochloric Acid Sp. gr. 1·16 to 100 Gm. of drug.

Fluidglycerate of Buchu is made with Buchu 100 Gm., Potash Solution 50 Cc., Glycerin 50 Cc., Water 100 Cc.

Fluidglycerate of Grindelia is made alkaline on the lines of that of Buchu. See also Beringer who has worked on similar lines.—Am. Jl. Ph. 1907,410; 1908,525; 1909,312.

Glycopasta is the name given to a Glycetract (*neutralised if necessary*), made into a paste for local use by mixing with Tragacanth 2 to 3%, *e.g.*, the following :—

P1 **Glycopasta Belladonnæ,** 0·375% Alkaloids. (Glycerinum Belladonnæ *q.v.* is about 0·5% Alkaloids.) P1 **Glycopasta Aconiti** is the Glycetract alone (no thickening necessary). (P) **Glycopasta Hyoscyami,** 0·075% Alkaloids. If considered too strong they should be directed to be diluted with Glycerin.

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*GLYL AND * SYL FLAVORING AGENTS (*Martindale*).

Our suggestion is to employ as flavoring agents to prescribed "mixtures," Solutions in either Glycerin or Syrup of pleasant tasting Essential Oils. These are called respectively ***Glyl** (T.M. 320797) and ***Syl** (T.M. 320798) throughout our pages.

'Glyl' and 'Syl' Flavoring Agents are stable within ordinary limits of temperature. Their use tends to uniformity and time saving, both in prescribing and in dispensing.

The preparation of the Distilled Waters hitherto employed, entails unnecessary labour, more especially as several, *e.g.* Cinnamon Orange Flower, Rose, have poor keeping qualities. Then again, many of the Aromatic Waters require the addition of either Glycerin or Syrup to render them of use in covering the taste of nauseous medicines. The same applies to Tinctures and Spirits.

Fresh infusions of drugs are useful, but though the infusions a
'*fresh*,' the drugs are mostly *dried* and have lost much of their arom
Of the usual flavoring tinctures that of Orange is the only one
use to 'cover' the taste of a nauseous drug, but a sweetening age
in addition is essential. Syrup of Orange by reason of its utili
has become hackneyed.

Glyls *and* **Syls** *have now been well tried and are much prescribed.*

Preparation.—

Glyl and Syl flavorings are all of uniform strength—1 of the Esse
tial Oil in 500 respectively of Glycerin or Syrup—or approximate
1 minim to the ounce, and are quickly prepared by placing half th
required amount of Glycerin (slightly warmed, *e.g.*, by standing th
bottle in a little hot water) or Syrup in a bottle capable of holdi
the full amount, adding the Essential Oil mixed with three times i
volume of 90% Alcohol in small portions with shaking, then addi
the remainder of the Glycerin or Syrup with further shaking.

Thus made and allowed to stand a short time for any excess
Essential Oil to rise (easily removed by passing through a pledg
of moist Cotton Wool), the following are perfectly clear. Th
solubility of these Oils in Glycerin is remarkable.

Glyl	vel **Syl**	*Amygdalæ Amaræ *sine* HCN.	**Glyl**	vel **Syl**	Limonis.
,,	,,	Anethi.	,,	,,	*Menthæ Piperitæ.
,,	,,	Anisi.	,,	,,	,, Viridis.
,,	,,	Aurantii Amari.	,,	,,	Myristicæ.
,,	,,	Aurantii Floris.	,,	,,	Pimentæ.
,,	,,	Carui.	,,	,,	Pini Pumilionis.
,,	,,	Caryophylli.	,,	,,	*Rosæ.
,,	,,	Cinnamomi.	,,	,,	Sassafras.
,,	,,	*Coriandri.	,,	,,	Thymi.
,,	,,	Fœniculi.	,,	,,	*Vanillæ (1 of Essenc *q.v.* in 8).
,,	,,	*Lavandulæ.			

The favorites in the series according to our taste are indicated by*

Glyl Aurantii Amari, Cinnamomi, Pini (excellent for Terebinthinou drugs), and Thymi are also good.

Glyl Pini and Syl Lavandulæ together is a useful combination.

Dose.—Of either Glyl or Syl, to flavor an ounce dose of a mixture 1 to 2 drachms, as a general rule, suffices. In the case of Glyl c Syl Menthæ Piperitæ ½ drachm will be ample.

Lævulosyls comprise a series of flavouring agents prepared o identical lines, using Lævulose, where the use of Sugar and Glyceri are not advised. The dose and preparation is similar. Glyls ar preservative—both the Oils and Glycerin are antiseptics.

E. O. Rowland suggested Glycerins of Lemon and Orange Peel made fro fresh peel.—C.D. i./14,594.

GOSSYPIUM.—*Syn.* Cotton Wool.

With data on Cellulose Products.

The hairs of the seeds of *Gossypium Barbadense* and of other specie of gossypium, freed from fatty matter, employed as a wound dressing

Manufacture of Cotton.—For details of bleaching and machiner required, see A. W. Gerrard, P.J. i./16,573.

Cotton Wool is soluble in an ammoniacal solution of copper oxide

The following surgical forms of **Cotton Wool (and Allied Dressings)** are in use. *See also* under the individual antiseptics for medicated preparations.

Bandages are made termed Black Cloth, Buttercloth, Calico, "Cataract" (of special form for bandaging after operation for), Crêpe (Geneva), Crêpe (Velpeau), Crinoline (for silicating and Plaster of Paris), Domette, Elastic Circular Stocking (Stockinette), Elastic (India Rubber Webbing), Flannel, Gauze, "Ideal" (a special elastic bandage), Muslin (for Plaster of Paris), Open Wove (absorbent), Plaster of Paris, Selvedge (white and grey) and Triangular Splint.

Battist, Milne's. A substitute for oiled silk, gutta-percha tissue and jaconet. Can be boiled, and is spirit and greaseproof.

Billroth's Cambric.—Cotton fabric treated by a special process. It takes the place of gutta-percha tissue and oiled silk, being sterilisable.

Buttercloth.—As a dressing for applying ointments, liniments, etc.

Cellulose Film in three varieties—

'Taffetas.'—A yellow film similar in texture to Yellow Oiled Silk and suggested as a substitute for same. It is perfectly *greaseproof* but swells slightly in contact with moisture, hence though suitable for use with Soft Paraffin basis ointments is not intended for applying dressings containing aqueous medicaments. It is nevertheless sterilisable by moist heat.

'Aseptafilm.'—This modification is colourless and being transparent and sterilisable may be applied direct to wounds.

Cellophane ('Cellafine.')—This variety is the thinnest and is used as a greaseproof covering for packing pharmaceutical and food products.

All the above are unaffected by Alcohol and Ether, but they expand in contact with moisture—contracting again on drying—in some cases this property is of distinct value.

Cellulose Wadding.—A cheap absorbent dressing. Is prepared from wood fibre. **Cellulose Wadding** is in sheet form.

Eye Pads are ready cut, round or oval, consisting of a layer of wool between two sheets of gauze.

Felt, thick, coated with adhesive solution, in sheets 28 inches by 18 inches and with soap plaster for bed sores.

Gauze Tissue, see Gauze and Wool Tissue.

Gauze, White Absorbent, is prepared in 6 yard pieces. Tela Depurata, P.G. is similar.

Gauze and Wool Tissue, plain and medicated with Boric Acid, Carbolic Acid, Iodoform, Ⓟ Mercuric Iodide, [P] Mercuro-Zinc Cyanide, Thymol, Picric Acid, are prepared.

Gauzes, Ribbon, as suggested by C. Stonham, have a woven edge and are used for plugging cavities and wounds.

The following are made in ¼, ½, 1 and 2 inch widths, in 12 yard lengths :— Alembroth, Aluminium Acetate, Boric Acid, Carbolic Acid, Iodoform, [P] Mercuro-Zinc Cyanide, Ⓟ Mercuric Perchloride, also Non-Medicated.

Gauze Tampons, 3 inches long and ⅜ to 1 inch in diameter (with thread attached), coated with soft soap, useful in obstinate constipation. Evacuation occurs in ½ hour.

Handkerchiefs, Aseptic (Silky Fibre), are medicated with Eucalyptus and Pine Oil, and Non-Medicated.—For phthisical sufferers.

Impermeable Piline.—⅓ the thickness of spongio-piline of felt, and instead of the waterproof india-rubber backing of the former, there is an antiseptic material, not affected by heat or strong spirit. For applying liniments in rheumatism, and where warmth is desired simultaneously.

Jute, in 1 lb. rolls for rough absorbent purposes.

Kapok Wool strongly advised as wound dressing. Useful absorbent of discharges.—B.M.J. i./18,276.

Sheep's Wool. *Syn.* THERMO-LAINE. Antiseptic for tampons. As a treatment for prolapse of the uterus ; applied every day by the patient. Does not absorb fluids, maintains size and gives support. May be impregnated with mercuric biniodide 1 in 10,000.

Has many advantages over Cotton Wool. A wrap of sheep's woo preferable to Gamgee Tissue. Other uses, *e.g.*, rheumatism, pulmonar affections, suggest themselves.

Sheep's wool not only kills fleas but has no attraction at all for them.— P. Delanoe, per Jl. Trop. Med., July 2, '23,327.

Lint (*vide also* Steriloid Dressings), absorbent, is made both non-medicate and medicated :—Boric, 50% coloured pink. Iodoform, 10%. Non Absorbent useful for local use. Styptic (10% Ferric Perchloride).

Linteum Carptum L.H. is plain absorbent lint.

Muslin, Nainsook, width 36 inches. Somewhat softer than buttercloth Is useful for ointments.

✱**Pontampons** (T.M. 307382) consist of a semi-solid slowly soluble medicate cone with a non-absorbent wool tampon attached—the whole encase in a soluble gelatin shell.

For the treatment of gonorrhœa, endometritis, cervicitis, vaginiti leucorrhœa, dysmenorrhœa, prolapsus uteri. The following are made :— (A). Ⓟ Ichthyol Compound—*i.e.*, Ichthyol 2·5%, Iodine 0·14%, Carboli Acid 0·5%, Powdered Hydrastis 1%. (B). Ichthyol 10%. (C). Protarg and Ichthyol, each 2%. (D). Ⓟ Opium and Hyoscyamus of each 2 grain Belladonna 1 grain. All these are made with a Boroglyceride basis.

Sanitary Towels, Hygienic, for menstruation, of Sphagnum (*q.v.*) ar absorptive, deodorant and antiputrescent. Southall's, Nos. 0, 1, 2, 4 and extra large, and the " Mene " are of cotton fabric. Maw's are i two brands, ' ordinary ' and ' superfine.'

✱**Kotex** (T.M. 426020, Cl. 11) **Sanitary Pads** are described as made c Cellucotton Wadding of high absorbency.

Sponge—Elastic skeleton of an aggregation of minute marine animal *Spongia officinalis. N.O. Ceratospongia.*—C.D. ii./30,274.

Sponges, Carbolised, have fallen into disuse but some surgeons still prefe them to cotton swabs. They are available thin and flat and can b kept in 1 in 20 Carbolic Solution. More suitable than gauze for soakin up blood.

Sponge Eduction.—In the treatment of cases of laceration of the finge in which a bare and protruding bone or extensive stripping of the skin wit denudation of the deeper parts may render amputation necessary. Th method makes it possible in most cases to save the full length of the stump Flat Turkey Sponge is used, soaked in 1 in 40 Carbolic Solution before th operation. For details of methods, *vide* L. ii./11,1348.

Circular Gauze and **Wool** pads, about 3 inches in diameter. Also sterilised (*vide* Steriloid Dressings).

Spongio-Piline.—Thick felt with waterproof india-rubber backing fo applying warm moist dressings.

Tillman's Dressing is Cellulose Wadding *q.v.*

Tow, Flax, *cf.* **Tenax.**

Wool, Absorbent Cotton (also non-absorbent).

Both the above also in thin sheets measuring 20 by 14 inches.

✱ " Steriloid " Dressings. (T.M. 260647).

These dressings have been submitted to a temperature of 250° F. for 3 minutes at a pressure of 15 lbs. in an autoclave. Each parcel of dressing i wrapped by a patent method in wool, parchment wrapper, and enclosed in a air-tight dustproof carton or hermetically sealed tin.

Bandages (in tins), 2, 2½, 3 and 4 inch.

Gauze, plain, absorbent, 1, 2, 6 and 12 yard cartons.

,, **Alembroth** and **Boric,** each 1 and 2 yards.

℗1 ,, **Cyanide,** 1, 2, 6 and 12 yard cartons.

Ⓟ ,, **Biniodide,** 6 yards.

Lint, plain, absorbent, **Alembroth, Boric,** and ℗1 **Cyanide.**

Wool, plain, absorbent, 1, 2 and 8 oz. cartons.

,, **Alembroth, Boric,** and ℗1 **Cyanide,** in 1 and 2 oz. cartons.

℗1 **Swabs, Cyanide.** Gauze, 4 × 4 inches, 12 in carton.

In addition, **Iodoform Gauze** (2 yards) and **Carbolised Wool,** 50, 10 and 250 Gm. are wrapped with aseptic precautions in similar carton but are not heated.

Combined cartons contain 1 ounce of plain absorbent wool with ½ yard plain absorbent gauze sufficient for a minor dressing and combined cartons containing Alembroth Gauze (6 yards) with wool and gauze tissue suitable for a major operation.

Swabs. Cartons contain: 12 small round pads suitable for eye-work; 6 larger round pads (about 2 inches in diameter); 12 gauze, 6 inches square; 12 wool and gauze tissue pads, 3 inches square; **tins** contain 10 gauze covered swabs, 4 inches square; also **tins** containing 10 swabs 6 inches square (*vide* also Triangular Swabs).

℗ **Swabs, Cyanide,** 12 in carton, 4 inches square.

Triangular Swabs have a pocket at one angle in which the finger or a probe can be introduced. For packing a cavity or wound during operation. In tins of 10 and 20 swabs.—Jackson Clarke.

Eye Pads, 1 doz. in carton; **Towels** (Tins of 4), 18 × 32 inch.

Wrappers 6 feet long with slit in same, 10 × 2 inches, for abdominal operations, also 3½ feet long.

Abdominal Set in flat tin with key, contains 12 swabs 6 × 8 with tapes, 12 swabs 6 × 6, with tapes, 4 towels, 32 × 18 inches, 2 thick pads 6½ × 8½ inches (as dressing), with 6 safety pins, 1 bandage 4 inch × 6 yards, 2 wrappers with sleeves, twelve 4 inch × 3 yard gauze rolls and 2 veils.

Eye Operation Set, No. 1, tin containing 3 Sterile Sets of the following:—12 small eye swabs, 1 special eye pad, 1 × 2½ inch bandage. (A set can be removed without impairing the others in any way.)

Eye Operation Set, No. 2, containing 1 × 2 inch bandage, 4 eye pads, 4 pieces gauze, 1 oz. wool.

Preparation of Medicated Sterilised Dressings.

The following notes are based on a paper by Beringer some years ago, and experience of our own in this class of work.

Specially cleansed rooms are of course required for work of this kind. All tables, floors, etc., should be scrupulously scrubbed with soap and Cresylic Disinfectant. The tables just prior to use should be washed down with 1 in 500 Perchloride Solution and then may well be covered with sheets of freshly sterilised parchment paper. Operators' hands, clothing, etc., require usual attention. Cartons, tins, wrapping paper, etc., should be heated in an oven at 120—150° C. for half an hour.

Absorbent Gauze.

The gauze suitable for use contains about 12 threads to the Cm., both on the woof and on the warp and is about 1 yard wide. This is wrapped and sterilised in convenient lengths for surgeons' use.

Moist Absorbent Gauze.

Sprinkle the Sterile gauze with Sterilised Distilled water containing 5% Glycerin and pack in previously sterilised amber glass jars and sterilise again.

Boric Acid Gauze, 20% (usually coloured pink).

Impregnate Gauze 100 with boiling Saturated Solution of Boric Acid tinted with magenta. Press out until it weighs 180 and dry.

Carbolised Gauze, 5%.

For this employ Phenol 5, Acetone 50, Water 50, Glycerin 5, to Gauze 100 as under Iodoform Gauze. (Dry.)

Iodoform Gauze, 10% (Dry).

Dissolve Iodoform 10 in Acetone 100, saturate Sterile Gauze 100 with the solution, evaporate the Acetone.

Iodoform Gauze, 10% (Moist).

Proceed as for Iodoform Gauze (dry) incorporating about 1% Glycerin in the Acetone solution.

℗ **Mercuric Iodide Gauze, 4%.**

Impregnate Gauze 400 under pressure with a solution of Mercuric Iodide 1 and Potassium Iodide 1, in Water 800. Less Liquid, *e.g.*, Water 400 will work equally well by adjusting the pressure. We have also employed for this quantity a mixture of Acetone 200 and Water 200.

℗ **Mercuro-Zinc Cyanide Gauze, 3%.**

Prepare a suspension of Mercuro-Zinc Cyanide 3 in Sterile Distilled Water 600 tinted with rosaniline and mix evenly by stirring or shaking with Gauze 100. Dry without pressing. Much more water is required than usually advised.

Picric Acid Gauze, 2%.
Picric Acid 2, Water and Acetone of each 50, Gauze 100.
Proceed as under Dry Iodoform Gauze.

Sal Alembroth Gauze, 1%.
Impregnate Gauze 100 under pressure with a solution of Sal Alembroth in Water 200 tinted with Anilin Blue. Less water may be used or a mixture of Acetone and Water, *e.g.*, Acetone 50 and Water 50.

All Gauzes should be sterilised at 120° to 150° C. for half an hour just before medicating.

If a steriliser be available—*cf.* Chapter on Sterilisation, a less temperature *e.g.*, 120° C. will be sufficient, furthermore the use of a vacuum apparatus will permit of excess of moisture being drawn off rapidly.

The preparation of **Wools,** and **Gauze and Wool Tissues** is on similar lines. We give brief notes of procedure under respective headings, *e.g.* **Gossypium Carbolisatum, Gossypium Ferri Perchloridi, Gossypium Sal Alembroth, etc.**

National Health Insurance requires the dressing to be issued to the patient wrapped in dustproof casing.

Dental Dressings.

For Dental use are prepared :—

Aseptic Dental Napkins.

Absorbent **Dental Rolls.** As a substitute for the napkin or rubber dam. For covering the mouths of the salivary ducts, a section may be placed on either side of a tooth, or the entire roll may be bent round the outside of the arch or under the tongue. No. 1, diameter $\frac{5}{16}$ inch; No. 2, $\frac{3}{8}$ inch; No. 3, $\frac{1}{2}$ inch; No. 4, $\frac{5}{8}$ inch; in $1\frac{1}{2}$ or 6 inch lengths.

Non-absorbent **Dental Rolls.**—To replace the rubber dam. In crown and bridge work. May be used in connection with the saliva ejector.

Sterilised Absorbent **Pledgets** for wiping out cavities.

Aseptic Absorbent Points are prepared for drying pulp canals.

Sterilised Bibulous Paper, in sheets, 3 inches by 10 inches.

Carbonised Cotton for filling pulp canals, and for treatment of exposed pulps.

Artificial Silk (*Syn.* 'RAYON') **Viscose, Cellulose Acetate** (✱CELANESE), (T.M. 411818 and 460218, Class 50). *Tests for Silk and Art Silk, and Solvents for same, previously in Vol. I., Edn. XIX.* are now transferred to Vol. II.

GOSSYPII RADICIS CORTEX.

The root bark from *Gossypium herbaceum* (*Malvaceæ*) and other cultivated species is *B.P.* '14. It contains about 10% acid resin.

Chemical Examination of the bark.—F. B. Power, P.J. ii./14,420.

Uses.—The following are given instead of Ergot to check uterine hæmorrhage in all its forms. May relieve dysmenorrhœa.

Extractum Gossypii Radicis Corticis.—Semi-alcoholic.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in pill.

℞ **Pilula Gossypii Composita.**

Extract of Cotton Root, Extract of Hydrastis, Ergotin, of each 1 grain. *Dose.*—One, 3 or 4 times a day.

Extractum Gossypii Radicis Corticis Liquidum, *B.P.* '14.

Dose.—$\frac{1}{2}$ to 1 drachm. The bark exhausted with a mixture of Glycerin 1, Alcohol (90%) 3; 1=1.

Flavoring.—Syl Lavandulæ, Glyl or Syl Cinnamomi.

Extractum Gossypii Seminis Pulverisatum. POWDERED COTTON SEED EXTRACT. *Syn.* ✱LACTAGOL (T.M. 252851).

Dose.—1 teaspoonful 4 or 5 times daily given in milk.

Said to increase the flow of milk and the nitrogenous constituents of same. According to the *Lancet* analysis it appears to consist practically entirely of protein substance, the total Nitrogen amounting to 15·68%.—L. ii./12,702.

Edestine. Stated to be the active principle, so far as galactogogue action is concerned, of cotton seed freed from fat, etc.—L. i./12,830.

Effect of *Edestine* on mammary secretion. Rat experiments. It is a good protein sparer and improves growth, but in large proportion (*e.g.*, 46%) the young die.—G. A. Hartwell, L. i./22,323.

Edestine is also obtainable from *Linseed* by precipitation with water from a 4% Saline Extractive. *Vide* also Vol. II. Peptic Index.

Tinctura Gossypii Radicis.

Dried bark of Root of Cotton Plant 1, Alcohol 60% 4.

Dose.—1 drachm (**4 Cc.**) three times a day.

GRINDELIA.

The dried leaves and flowering tops of the 'Gum Plant,' *Grindelia Camporum* (*B.P.* '14). The involucre, and often the leaves, are coated with oleo-resin. The medicinal action is due to resins.

Uses.—For the spasmodic attacks which occur in asthma, whooping-cough and bronchitis, and given in heart disease to slow and regulate the pulse.

Extractum Grindeliæ (by alcohol extraction).

Dose.—2 to 3 grains (**0·12 to 0·2 Gm.**) three times a day

Extractum Grindeliæ Liquidum (*B.P.* '14).

Exhaust herb with alcohol (90%), distil, add Sodium Bicarbonate to residue and water *q.s.* with alcohol (90%) one fourth to make 1=1.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**) at the onset of a paroxysm of asthma, repeated every hour, in sweetened water or milk.

Flavoring.—Syl Pini (very good), Syl Lavandulæ.

Spiritus Grindeliæ Compositus.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water every two to four hours while attack of asthma lasts.

Liquid Extract of Grindelia 15 minims, Sodium Iodide 2 grains, Nitroglycerin Solution $\frac{1}{2}$ minim, Tincture of Euphorbia Pilulifera 20 minims, Spirit of Chloroform to 1 drachm.

Extractum Grindeliæ Compositum.

Dose.—1 drachm (**4 Cc.**) with a small quantity of Spirit, *e.g.*, 2 drachms of Brandy in $\frac{1}{2}$ tumbler of hot water.

Liquid Extracts of Grindelia, Chekan and Yerba Santa each 1, Liquid Extract of Quebracho 3. Suggested for use in asthma.

GRINDELINE. *Dose.*—1 to 2 drachms in water every 2 to 4 hours. A speciality containing Liquid Extract of Grindelia 15 minims, Potassium Iodide 2 grains, Trinitrin $\frac{1}{200}$ grain, Tincture of Euphorbia Pilulifera 20 minims in each drachm.

GUAIACI RESINA.

The resin (a constituent to the extent of about 20%) obtained fro *Guaiacum officinale* or from *Guaiacum sanctum* (*Zygophyllaceæ*). Th resin contains chiefly (amorphous) Guaiaconic Acid and other con stituents. The heart wood of these trees is **Guaiaci Lignum** *B.P.* '14.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Soluble almost completely in ether, chloroform, absolute alcoh and in sal volatile.

1 Gm. of the Resin shaken with 5 Cc. Petrol, filtered and diluted with 5 C of 1 in 1,000 Copper Acetate Solution should not give a green colour—absen of Colophony Resin.

Uses.—In chronic rheumatism and lumbago, and for chron sore throats; added to purgatives is useful in gout and for sluggis liver. It is a laxative in itself.

For dysmenorrhœa, 10 grains of the resin three times a day. this causes flatulence or colic add to each dose 1 grain of Dover Powder. The patient should begin taking it a week before the perio

It is also given to relieve amenorrhœa.

Capsules and **Slipules** (No. 1) **of Guaiacum Resin,** 5 grains; als **Tablets of Guaiacum Resin and Sulphur** 3 grains (0·2 Gm.) of each.

Useful for gout and rheumatism, *cf.* **Chelsea Pensioner.**

Elixir Guaiaci—*Dose.*—1 to 2 drachms. Guaiacum Resin 1 Tragacanth 1, Acacia 1, Syl Pini 50, Simple Elixir to 400.

Suggested for use in acute tonsillitis.

Tinctura Guaiaci Ammoniata (*B.P.* '14).

Dose.—$\frac{1}{2}$ to 1 drachm.

One of Resin in 5 of Ammonia-Alcohol Solvent, with Oil of Lemon an Oil of Nutmeg as flavourings.

Flavoring.—Syl Pini; Syrupus Zingiberis.

This is very useful where the uvula and fauces are enlarged.

Tinctura Guaiaci. *Dose.*—1 drachm. 1 in 5 alcohol (90%).

Trochisci Guaiaci Resinæ (*B.P.* '14). Three grains of Guaiacu Resin with fruit basis.

GUAIACOL.

$C_6H_4.OCH_3.OH = 124·0624$.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**). U.S. X. has *average do* 8 minims. This approximates the *max. single dose* of the Fr. C

A colourless refractive liquid, a constituent of Beech-wood Creosot but is also made synthetically from Pyrocatechin, in colourles crystals, melting at about 28° C. Sp. Gr. 1·116 to 1·14 (*B.P.* '*14*) *The crystals should be only dispensed when so ordered.* The crystal are official in **P. Belg. IV., Ph. Ned, V., P. Ital. V.** and **F.E. VIII.**

Solubility.—Both forms are soluble in Alcohol, Ether, Oil Glycerin, slightly in water, with taste and odour resembling Creosot

Uses.—In phthisis, particularly in incipient stages, may b prescribed in capsules (Guaiacol Carbonate), or cordial, *e.g.*, Guaiac 13·5, Tincture of Gentian 30, Alcohol (90%) 250, and Sherry to 1,000 two teaspoonsful two or three times a day in water—or as Mistur Guaiacol, *vide postea.*

Antiseptic and antipyretic. It is sometimes rubbed into or painted on the skin, covered by oiled silk; begin with 10 minims and increase to 30 or more; do not cover more than the space of the palm of the hand at a time.

Mistura Guaiacol, G.H.

Guaiacol 4 minims, Alcohol 5 minims, Glycerin 30 minims, Cinnamon Oil 1 minim, Tragacanth Mucilage 1 drachm, Water to 1 ounce.

Mistura Guaiacol cum Quinina.

Dose.—½ drachm gradually increased to 2 drachms, well diluted with water, thrice daily after meals.

Guaiacol 30 to 40 minims, Quinine Hydrochloride 20 to 25 grains, Alcohol (90%) 2 ounces, Compound Tincture of Gentian 3 ounces, Water to 8 ounces. The small dose of Guaiacol thus givenis increased by giving Guaiacol Carbonate in Capsules.

Pulmonary tuberculosis is treated with Guaiacol, *e.g.*: Guaiacol 1 drachm, Alcohol (90%) 1 ounce, Syrup of Lemons 1 drachm, Spirit of Chloroform 2 drachms, Water to 6 ounces.

Dose.—½ ounce thrice daily. Increase Guaiacol by 2 minims each week until a dose of 12 to 15 minims is given thrice daily, and continue for four months or more.

Perles of Guaiacol contain 1, 2 or 3 minims, dissolved in oil. **Capsules** 2 and 5 minims, *best made with Guaiacol Carbonate.*

Pilula Guaiacol 1 to 3 grains (crystal).

Capsules of Guaiacol (Carbonate) 1 grain, **with Iodoform** 1 grain and Almond Oil 5 minims, are prepared for use in phthisis, also of Guaiacol ¾ grain, with Cod Liver Oil, 5 minims.

Injections of Guaiacol 5%, and **Iodoform** 1%, in sterilised olive oil, have been used in tuberculosis, they are not free from danger.

Dose.—One, increased to three Cc., but better *per os.*

Durant's Injection. Guaiacol 5, Iodine 1, Potassium Iodide 10, Sterile Olive Oil 100. In pulmonary phthisis.

For tuberculous uveitis Guaiacol has been extolled. 1 Cc. of 1% Solution injected, but these subconjunctival injections are not approved by all.

Injectio Guaiacol Iodi et Camphoræ.

Dose.—4 minims (**0·25 Cc.**), intramuscularly, increased at three-day intervals to 15 minims (**1 Cc.**) and this repeated every 2nd or 3rd day.

Contains Guaiacol and Iodine (in oily *combination* as in Iodinol). *aa*: 10% and Camphor 5%.

Sterules of Guaiacol, Iodine and **Camphor** are made containing ½ and 1 Cc. of the injection.

Rheumatoid arthritis and articular fibrositis, other than the post-infective gouty and gonorrhœal forms, well treated.—G. Watson Smith, B.M.J. ii./25,648.

Vapor Guaiacol Compositus.

Guaiacol and Terebene of each 2, Menthol and Thymol of each 1, Spirit of Chloroform 3. Inhale 5 to 10 minims from an inhaler night and morning. Employed in phthisis.

℞ ℙ1 **Fuller's Inhalant.**

Guaiacol 4, Menthol 2·5, Sydenham's Laudanum 125, Compound Tincture of Benzoin to 250. Sometimes Terebene 4 is added.

Unguentum Guaiacol. Guaiacol 1, Lanolin Ointment (or other suitable basis) 5, useful in orchitis and mumps, and in tuberculosis.

Rheumatoid arthritis is treated with Guaiacol 1, Iodine Tincture 7, to be painted on the joints twice daily with a mixture internally of Ammonium Chloride 15 grains, Iodine Tincture 5 minims, Carbolic Acid 2 grains thrice daily.

Pigmentum Guaiacol.—Guaiacol 1, Olive Oil 1, dissolve.

In eye diseases, *e.g.*, interstitial keratitis, irido-cyclitis, vitreous opacities, sympathetic ophthalmia and optic neuritis, Guaiacol found to be more *certain diaphoretic* than Pilocarpine. Never used in more than 30 minim doses.

***Caution.*—Pigmentum Guaiacol R.N.H.** is Guaiacol 25 minims, Menthol 25 grains, Olive Oil to 1 ounce. For use in throat work.

Guaiacol 3 drachms, Olive Oil to 1 ounce. Of benefit as a throat paint in infected tonsils.—Hamblen Thomas, Pr., Nov. '31,557.

In leprosy, external and internal use of value. Used externally, the Guaiacol is rapidly absorbed. Pills 0·1 Gm. with Eucalyptol 0·04 Gm.—two morning and evening, gradually increased, until 10 pills (=1 Gm. Guaiacol) taken daily. Alkaline baths twice weekly, and substantial diet enjoined.

Guaiacol Benzoas, Guaiacol Benzoate. — *Syn.* ✱Benzosol. (T.M. 97425) $C_6H_4.OCH_3.O.CO.C_6H_5$=228·0936.

Dose.—4 to 12 grains (**0·25 to 0·8 Gm.**) in cachet.

Manufacture.—The expired patent 5366 (1890) method is misleading. We found that heating Guaiacol crystals 12, with Benzoyl Chloride 15 at 150° C. till Hydrochloric Acid ceases to evolve, then pouring into 100 Cc. of 15% solution of Sodium Carbonate gave a theoretical yield.

In small crystals, almost tasteless, nearly insoluble in water.

Incompatible with alkalis. Useful in incipient phthisis (especially the diarrhœa of), and in diabetes mellitus.

Tablets, 5 grains. *Dose.*—1 or 2.

Guaiacol Camphorate.—*Syn.* Guaicamphol.

$[C_6H_4.OCH_3.O]_2(CO)_2C_8H_{14}$ or $C_{24}H_{28}O_6$=412·2184.

Dose.—5 to 10 grains in cachets or 5 grain tablets.

Soluble only very slightly in alcohol, insoluble in water; for night-sweats and diarrhœa of phthisis.

Guaiacol Carbonas (*B.P.* '14), and majority of Pharmacopœias. *Syn.* ✱Duotal. (T.M. 197371) $(C_6H_4.OCH_3.O)_2CO$=274·1076.

Patent 19074/90, now ***Public Property.***

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**), gradually increased.

Capsules and **Tablets,** 5 grains.

A white crystalline substance, tasteless, and with slight odour, soluble in alcohol about 1 in 200, insoluble in water, slightly in ether, but readily in chloroform and in benzene.

Uses.—In phthisis, improves appetite, and lessens cough, expectoration and night sweats, also in typhoid and for bronchitis.

In rheumatoid arthritis, both the subacute and chronic forms. It arrests the disease and diminishes size and increases movement of joint and relieves pain, by probably inhibiting growth of the specific organism in the intestinal tract, and combining with the bacterial toxins and assisting in their elimination. At first from 5 to 10 grains in cachets thrice daily increasing by one or two

grains each week until each dose is 15 to 20 grains—to be continued at least twelve months. At the same time a mixture containing 10 grains of potassium iodide in each dose. Combine with tonics.—A. P. Luff.

Guaiacol as anæsthetic in nose, throat and ear operations.—Pres., May, '20, p. 202.

Guaiacol Cinnamate.—$C_6H_4O.CH_3O.C_9H_7O = 254{\cdot}1092$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white granular crystals, insoluble in water. For intestinal phthisis and vesical catarrh. Splits up into its constituents.

Guaiacol Iodide.—$C_6H_3.OCH_3.OI = 249{\cdot}9866$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). A brown powder insoluble in water, containing about 10% of Iodine used as an intestinal antiseptic, etc., and suggested in phthisis.

Note.—Guaiacol Iodide chemically would contain slightly over 50% Iodine. The above is a diluted preparation.

"Iodised Tincture of Guaiacol." *Dose.*—1 drachm twice daily. A proprietary medicine used in pleurisy and synovitis of various types.—J. Maberly, L. i./29,437.

Potassium-guaiacol-sulphonate. Fr. Cx. Supp. II., P. Ital. V., P. Jap. IV., P.G. VI., Ph. Ned. V. ✱**Thiocol** (T.M. 219605).

$C_6H_3(OCH_3)OH.SO_3K = 242{\cdot}2146$.

Dose.—15 grains (**1 Gm.**) thrice daily. Tablets contain 5 grains: Syrup 1 drachm = 5 grains.

In colourless crystals with slight Guaiacol odour, soluble in water, 1 in 6, slightly in Alcohol. Contains 52% of Guaiacol.

Has been recommended in phthisis, bronchitis and pneumonia, also for intestinal catarrh.

It passes unchanged through the body.—J. M. Fortescue-Brickdale, B.M.J. i./15,107.

Syrup of Potassium Guaiacol-Sulphonate formula for N.F.—P.J. ii./31,265.

Calcium-Guaiacol-Sulphonate. *Syn.* Guaiacyl. *Dose.*—10 minims (**0·6 Cc.**) of 5% solution or 1 Cc. of 10% solution subcutaneously. Local anæsthetic.

Has been employed intravenously, 0·33 Gm. in 20 Cc., in tuberculosis and pulmonary affections. This dose is equivalent to ½ grain of Calcium and 3 grains of Guaiacol.

Guaiacolsulphonic Acid and its salts do not yield Guaiacol in the system and they are therapeutically inactive.—Y.B.P., '24,340.

HAMAMELIDIS CORTEX ET FOLIA.

Witch Hazel Bark and Leaves.

Dose of bark, twigs, and dried leaves, 10 to 30 grains (**0·6 to 2 Gm.**).

The bark and leaves, fresh and dried, of *Hamamelis virginiana* (*Hamamelidaceæ*)—*B.P.* '14. Witch Hazel is imported from the United States; it possesses astringent properties.

Uses.—To check hæmorrhages and excessive mucous discharges, and for piles.

Liquor Hamamelidis of Commerce, a distillate of the fresh leaves containing about 14% alcohol by volume. Sp. Gr. about 0·980.

Dose.—½ to 3 drachms (**2 to 12 Cc.**), and used externally for piles and by rectal injection for internal piles, and to check epistaxis, bleeding from toothsockets, and is applied to bruises.

British Made Liquor Hamamelidis.—We had occasion in 1918 to distil a small quantity of this from (fresh) leaves cultivated in this country by E. M. Holmes. The aroma was excellent.

For piles, 5 minims of a mixture of equal parts of the liquor and glycerin containing 10% of Phenol, have been injected into piles hypodermically. *cf.* Tom Bird, L. ii./16,149.

Hazel Foam (Martindale). *Syn.* **Skin Food.** A soothing, non-greasy ointment basis. May be medicated with all forms of antiseptics and skin applications, *e.g.*, Ichthyol 3%; Ichthyol 3 to 10% with Resorcin 5%; Salicylic Acid 1%; Liquor Carbonis Detergens 10%; Cade Oil 5%; Carbolic Acid 1 to 2½%.

Cremor Hamamelidis L.H.

Solution of Hamamelis 60 minims, Soft Paraffin 120 grains, Wool Fat (Anhydrous) to 1 ounce.

Modern Cosmetic Preparations. The usual beauty specialist's advice is to cleanse with Cold Cream and apply Vanishing Cream (*e.g.*, Hazel Foam, *antea*) and finally powder the face. At night the skin is cleansed with Cold Cream and a skin food applied. Glycerin must upset the metabolism of the epidermal cells of the face. Possibility of increase in the number of rodent ulcers in the next 20 years. The fats in creams block the sebaceous and sweat glands. Perspiration is interfered with and temperature of the skin rises with continued dilatation of superficial blood capillaries, and finally acne rosacea. Formation of comedones is facilitated and acne vulgaris may develop. Wrinkle removers and skin tighteners both contain Zinc or Alum, both bad in the end. Formulæ for skin foods are provided, *e.g.*, Liq. Hamamelidis, Ung. Altheæ, Ung. Cetacei and Ung. Aquæ Rosæ of each 1 oz.—R. M. B. Mackenna, B.M.J. i./30,899.

See also further abst. under ***Hair Dyes.***

Extractum Hamamelidis Liquidum (*B P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 1=1 preparation of the dried leaves made with 45% Alcohol.

The liquid extract is representative of the leaves.

Varicose Veins and consequent ulcers. The following is good. Saturate a double layer of lint with the liquid extract, cover the part and gently bandage. As it dries do *not* pull off but add more of the extract. Healing rapidly effected.—A. T. Thompson.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

Hæmorrhoids well treated by interstitial injection of 2 to 5 minims of a 10% solution of Carbolic Acid in Liquid Extract of Hamamelis. A patient who had suffered for a year required 7 injections—another case of 15 years' duration needed only 5. The greater the number of piles, the greater the number of treatments required. Patients stated that their rectal and general condition was greatly improved after the first injection.—J. Dunbar, B.M.J. ii./23,808.

Sterules of Hamamelis and Phenol of the above strength, ½ Cc. are prepared.

Carbolised Almond Oil is now largely used in preference, *q.v.*

Hamamelin.—*Syn.* **Hamamelidin.**

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. The powdered extractive from the bark or (of greenish colour) made from the leaf.

A Suppository of 1 to 3 grains with cacao butter is useful for piles.

℞ ℙ1 **Compound Hamamelis Suppository.**—Hamamelin 1 grain Orthoform 5 grains, Cocaine Hydrochloride ½ grain, Opium Extract ⅙ grain, Belladonna Extract ⅙ grain, Cacao Butter to 60 grains. For internal hæmorrhoids.

℗ **Suppositoria Hamamelin, Conii et Eucainæ.**

Hamamelin 5 grains, Conium Extract 4 grains, Eucain ½ grain, in Glyco-Gelatin to 30 grains. Rub down the drugs first with a very little warm water. In painful hæmorrhoids.

℞ ℙ1 **Suppositoria Hamamelin et Hydrargyri Composita.**

Mercurial Ointment 1 grain, Hamamelin 2 grains, Ergot Extract 1 grain, Belladonna Extract 1/6 grain, Morphine Sulphate 1/6 grain, Tragacanth *q.s.*, Cacao Butter to 15 grains.

The ingredients were prescribed by the late Campbell Williams with following intent :—The Mercury to act on prostatic hyperæmia often present with piles. Hamamelin on the mucous membrane, Ergot on the muscular walls of blood vessels, Belladonna the same and sedative, Morphine analgesic and vaso-constrictor. The Theobroma Oil as local mechanical lubricant and the Tragacanth for consistency.

Tinctura Hamamelidis (*B.P.* '14).

Bark, in No. 20 powder 1, Alcohol (45%) *q.s.* to 10.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Is given quite irrationally to check bleeding from the lungs or other organs. The tannin to which its local action is due is converted into sodium gallate on reaching the blood—this substance has no remote astringent action.—B. P. C.

An injection for bleeding piles, ½ drachm of the tincture in 1 ounce of cold water should be given as an enema, and retained, at bedtime or before breakfast, every day.—R.

A lotion of 1 or 2 drachms with water to an ounce, is a useful application to bruises and small wounds.

Unguentum Hamamelidis (*B.P.* '14).

This Ointment is largely employed for piles. It may be filled into **Hollow Suppositories.** A combination ℞ ℙ1 with Cocaine 2% is useful.

HEXAMINA.

$(CH_2)_6N_4 = 140{\cdot}1256.$

Syn. **Hexamethylenetetramine.** (B.P.'14) **Hexamethylenamina,** P.G.VI., Ph. Ned. V., P. Jap., Fr. Cx. Supp. 1920, F.E. VIII., P. Belg. VI., P. Ital. V., **Methenamina, U.S. X., Urotropine, Aminoform, Formin, Formamine,** ✱ **Cystamine** (T.M. 231536). **Cystogen,** ✱**Metramine** (T.M. 262384). **Uritone,** ✱**Vesalvine** (T.M. 278095) **Urisol** (F.E.).

Trade Mark : 'Urotropine' No. 215652 was ***Avoided*** by Order of the Board of Trade.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in a large volume of water, or it may be carbonated water.

Ph. Ned. V. For children, 3 to 4 grains in water to 5 times during the day. *Max. single dose,* 1 Gm. *Max. daily dose,* 4 Gm.

Intravenously.—We have knowledge of 1½ Gm. dose in 10 Cc. Stronger doses have been given. *v.p.* 452.

Manufacture.—Mix 1 Volume of Commercial Formalin Solution with 2 Volumes of Liquor Ammoniæ (10%). Allow to stand for a few hours in a loosely covered vessel, and evaporate on the water bath to dryness, taking care that Ammonia is in excess during the process. Recrystallise from Alcohol.

If commercial Ammonium Carbonate is treated with 40% Formic Aldehyd solution it readily dissolves, even without application of heat, with bris evolution of Carbon Dioxide and formation of Hexamine. Evaporate t dryness on water bath under reduced pressure and sublime or recrystallis from absolute alcohol. The Ammonium Carbonate should be about 10% in excess of theory.—J.C.S.A. i./20,292. Other Ammonium salts reac similarly.—*Ibid.* 373.

Flavoring.—It has only slightly bitter taste. Syl Lavandulæ Syl Rosæ ; Syrupus Aurantii.

Colourless crystals, sublimable. ***Soluble*** 1 in 1½ of wate with alkaline reaction, in Alcohol 90% 1 in 8, almost insoluble i Ether. A valuable diuretic and solvent of Uric Acid concretions.

It burns with intense heat and without soot. A 5 grain tablet will boil test tube half-full of water.

Sterilisation of Solutions.—We determined there is no de composition of a 40% solution on heating 20 minutes at 100° C. *See Vol. I.*

Uses.—It relieves cystitis associated with putrefaction an destroys typhoid bacilli in the urine. The pyuria of tabes dorsalis cholelithiasis and gonorrhœa (early stages) have been well treated.

As an urinary antiseptic, Hexamine decomposes, liberating Form aldehyde more readily in presence of acid than alkali, hence th administration of **Sodium Acid Phosphate** is advised. It may b well to give the latter an hour or two hours *before* the Hexamin or at any rate not in mixture form with the Hexamine.

U.C.H. directs **Mistura Hexaminæ** No. 1 : Hexamine 10 grain Chloroform Water to 1 drachm, half an hour *before* food and No. 2 Sodium Acid Phosphate 30 grains, Chloroform Water to 1 drachm half an hour *after* food.

Should never be given immediately after meals, but taken in water ½ ho before meals.—B.M.J. i./24,750.

Pharmacology.—We have found that, though the amou of Formaldehyde liberated from therapeutic doses of Hexamin cannot be sufficient to kill *B. Coli, the slow generation of Formaldehy by the drug in the presence of acid has the desired effect.* It is preferab therefore to raise the acid index of the urine within reasonable limit

For details of our work, see Hexamina, Vol. II.

A recent investigation.—On maintaining a solution of 1 Gm. of Hexamine 200 Cc. of 0·2% HCl at 40° C., estimations of the liberated Formaldehyde show that after 30 minutes 1·5% of the Hexamine had been decomp ently band *½ hou 9% and after 3½ hours 18% decomposition had occurred.* ealing ra

That Hexamine owes its activity to formation of Formaldehyde is consider a myth.—G. E. R. McDonagh, M.P.C., Jan. 12, '27,27.

Hexamine 5 grains, Sodium Acid Phosphate 30 grains, Mist. Rubra to ounce, kept in an ice-box had not changed in a fortnight, but kept in a cupboa did give Formaldehyde reaction.—H. Bodsworth, P.J. i./29,95.

Hexamine proved conclusively *not a diuretic.*—H. O. Rich and P. J. Hanzli per Pres., Feb., '23,84.

AURAL SUPPURATION and MENINGITIS. Hexamine has been tried, b neither it nor Formaldehyde could be detected in the discharge or cereb spinal fluid.—D. Guthrie, B.M.J. ii./16,455.

BLADDER DISEASES. 20 to 40 grains daily suffice, while in gall bladd infection, or purulent meningitis, from 200 to 300 grains daily may be require Give well diluted (2 grains to the ounce of diluent) *per os* or it may, if necessar be given by rectum or subcutaneously.—A. C. Burnham.

Superior to Mercurochrome and Hexyl-Resorcinol in infection by *Sta albus* and *B. coli.*—Jl. Urol., April, '26,351, per Pres., Jan., '27,8.

Hexamine 3 grains, and Methylene Blue ¼ grain, to enhance the well-know action of Hexamine.—B.M.J. ii./25,18.

Cholecystitis.

Gall stones are found in about 10% of the bodies of all people dying after the age of 20. In most cases, if not all, their formation is preceded by cholecystitis and as cholecystitis is often not followed by cholelithiasis the former must occur therefore at some period in the lives of a considerable proportion of all adults—the most common of all abdominal diseases. The medical treatment of cholecystitis often leads to recovery. It consists in attempting to sterilise the biliary passage by large doses of Hexamine and in promoting biliary drainage. Knott has shown Hexamine acts as a ***biliary antiseptic in spite of alkalinity of the bile.*** Hence alkalis may be given to keep the urine permanently alkaline to prevent the bladder being irritated by the Formalin formed in acid urine. Two mixtures are made, one with Hexamine 100 grains to the ounce, and the other containing 1 drachm each Sodium Bicarbonate and Potassium Citrate to the ounce. Half ounce of the former and one ounce of the latter are given after breakfast, after tea, and after a tumbler of milk or water last thing at night. The dose of Hexamine mixture is increased by 1 drachm each day until the full dose of 100 grains is taken three times daily. Knott has recovered Hexamine from the bile, obtained with a duodenal tube, and has demonstrated sterilisation of infected bile. Biliary drainage is promoted by Magnesium Sulphate *per os*. To give it directly into the duodenum is not necessary.—A. F. Hurst, B.M.J. ii./26,676. See also Pr., Jan. '31,93.

Operations on the biliary tract should be preceded by Hexamine 10 grains three times a day for a week at least.—W. E. M. Mitchell, L. ii./27,270.

COMMON COLDS can be aborted by Hexamine. The drug is stated to be excreted by the saliva and bronchial mucous membrane, hence the idea. It should be given at once when the discomfort begins—15 grains four times during 24 hours in water. Patient should drink water copiously to reduce bladder irritation.

EPILEPSY. Excellent results from the following treatment. Hexamine 1½ drachms, Sodium Salicylate 1½ drachms, Ammonium Benzoate 1½ drachms, Potassium Citrate 6 drachms, Chloroform Water to 6 ounces—½ ounce in Soda Water before breakfast twice weekly: with Ammonium Bromide 4 drachms, Sodium Citrate 4 drachms, Chloroform Water to 6 ounces—½ ounce in Soda Water night and morning: and one Luminal Tablet, 1 grain, after lunch. The Hexamine combined with the other remedies, while not irritating the bladder, helps to destroy what is probably cause of fits—organic dirt, chiefly *B. Coli*.—E. G. McCarthy Morris, 1931.

A case of 20 years' standing, having 3 to 8 fits a day, which 60 grains of Bromide thrice daily failed to control, was cured by this treatment.—E. G. McCarthy Morris, L. i./26,834.

EYE INFECTIONS. Considerable success with Hexamine and Acid Phosphate internally in inflammatory conditions of the anterior chamber of the eye (J. H. Fisher, R.O.H.).—M. A. F. Sherif, Jl. Pharm. and Exp. Therap., Feb. '30,237.

PHLEBITIS. The following mixture taken twice, thrice, or oftener weekly, prevents recurrence: Hexamine, Sodium Salicylate, and Ammonium Benzoate, of each 1½ drachms, Potassium Citrate 6 drachms, Chloroform Water to 6 ounces—½ ounce in Soda Water before breakfast.—E. G. McCarthy Morris, 1931.

POLIOMYELITIS, ACUTE. Child aet. 11 became acutely ill suddenly. Weakness of legs. Temperature 104°. Hexamine 10 grains every four hours. After two days temperature lower but paralysis more marked. Next day improvement, but in the evening, after 150 grains had been given, hæmaturia with considerable strangury occurred. After three days paralysis ceased and ultimately the renal symptoms. Complete recovery in sporadic cases is rare.—N. Fox Edwards, B.M.J. ii./16,620.

Hæmaturia caused in a case of acute encephalitis due to Hexamine in doses of 20 grains every 6 hours.—Sir Thomas Horder, B.M.J. i./27,995.

RESPIRATORY AFFECTIONS (acute bronchitis, acute rhinitis, etc.) are treated with it.

RHEUMATOID ARTHRITIS. The following treatment generally affects a cure in about 3 years in early cases, and will always relieve pain. Hexamine, Sodium Salicylate and Ammonium Benzoate, of each, 1½ drachms, Potassium

Citrate 6 drachms, Chloroform Water to 6 ounces—½ ounce in Soda Wate every morning before breakfast: Dover's Powder and Aspirin, 2½ grains c each, in tablet, powder, or cachet, night and morning, increased to two nigh and morning if required: Capsule Lipiodol after lunch: and Methyl-Aspriodin Liniment rubbed twice daily on the painful parts. Meat allowed, but Alcoh prohibited. Also of value in sciatica.—E. G. McCarthy Morris, 1931.

RINGWORM OF THE BEARD. Treatment.—A 5 to 10% solution of Urotropi is sponged on the part affected. This is allowed to dry and a solution c Dilute Sulphuric Acid 1 to 3% is then sponged over the affected area. Ther were most gratifying results in the condition known as "foul shave." Whe the parasite is the ringworm fungus this method is undoubtedly a specifi It cured the most chronic case when continued for 4 or 5 weeks in graduall increasing strengths.—J. Craik Taylor.

TYPHOID. 20 grains or more three times in 24 hours with an equal quantit of Sodium Citrate and Sodium Bicarbonate, starting from the beginning the second week onwards. If cholecystitis appears give ten 20 grain dos with sufficient alkali in 24 hours and apply Antiphlogistine over gall-bladd region.—A. E. Gow, L. i./30,96. *See also Therapeutic Index.*

INFECTIONS OF THE BILIARY PASSAGES. Sufficiently large doses (75 grai *per diem*) will inhibit growth of bacteria in the bile, *e.g.*, in typhoid.

WHOOPING COUGH. May also be of value, *e.g.*, with Syrupus Thymi.

Intravenous injection of Hexamine.

Hexamine Sterules 15 grains (**1 Gm.**) in 75 minims (**5 Cc.**) a prepared, *i.e.*, a 20% solution. Frequent mention in the literatu is made of 40% solution.

ACIDOSIS, NON-DIABETIC. Due to infection with *B. Coli*, well treated intravenous injections.—J. Fraser, B.M.J. i./24,571.

CHOREA in children well treated intravenously. In one case 18 injectio increasing from 2 to 6 Cc. of a 5% solution, were made in 6 weeks. Mc recently 10% solution has been used with good results.—Per Jl. A.M. ii./25,1098. Seems to give best results by intravenous injection when t chorea is associated with an infection, *e.g.*, encephalitis or polyarthritis. De Capua, Jl. A.M.A. ii./20,808.

MALARIAL COMA cured in 10 cases by intravenous injection of 3 Cc. 40 solution.—J. Umansky, L. ii./31,350.

PYELITIS OF PREGNANCY. A single injection of 10 Cc. of the Solution often sufficient.—A. Jacobs, Pr., Oct., '27,219.

RETENTION OF URINE. Treated by 5 to 10 Cc. of 40% Urotropine Solutio —B.M.J.E. i./23,65. Has been used in cystitis, pyelitis and toxæmias.

POST-OPERATIVE ANURIA. 7 to 10 Cc. 40% solution intravenously- procedure uniformly successful.—L. i./24,1118.

SCABIES, severe, well treated. 10 Cc. of a 10% solution daily for 3 or days, septic lesions being washed with hot water only during period of injectio but course of injections followed up by application of Sulphur Ointment.— N. N. Ghosh, I.M.G., May, '25,221.

Vesalvine Tablets 5 grains and **Vesalvine Effervescent**, 5 grai in 1 drachm are prepared.

Hexamine Triborate *Syn.* ✱BOROVERTIN (T.M. 29436

Ph. Ned. V. $(CH_2)_6N_4.3HBO_2=271{\cdot}909$.

Dose.—15 to 60 grains (**1 to 4 Gm.**) daily.

Manufacture.—By combining 1 molecule Hexamethylenetetrami with 3 molecules of Boric Acid—$3H_2O$ are set free and the Boric Acid converted into Metaboric Acid.

Crystalline powder containing about 50% Hexamethylenetetramine, solul in water 1 in 13: taste bitter. Urinary antiseptic, *e.g.*, in gonorrhœal cystit pyelitis, renal calculus and tuberculosis of the bladder and kidneys.

✱Vesalvine 'B.' *Syn.* HEXAMETHYLENETETRAMINE BENZOA

$(CH_2)_6N_4.C_6H_5.COOH.=262{\cdot}1724$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Small scaly crystals containing about 53% of the base. Made

combining equivalent quantities and crystallising. Soluble 1 in 50 of Water and 1 in 2½ Alcohol 90%.

Uses.—As an urinary antiseptic.

***Crystazol** (T.M. 364369). *Syn.* HEXAMINE-SODIO-BENZOATE. **Tablets.**—10 grains (**0·6 Gm.**).

Dose.—One to three dissolved in water twice or thrice daily, in bacterial infections of the urinary tract.

***Uro-Hexoids** (T.M. 365610). Tablets of HEXAMINE AND LITHIUM BENZOATE.

Dose.—One or two after each meal, taken whole or crushed and dissolved in water. Urinary antiseptic, diuretic and anti-lithic.

In cystitis, pyelitis and tuberculosis of the bladder and kidneys, also for chronic posterior urethritis and prostatitis and rheumatic affections.

***Vesalvine 'S.'** *Syn.* HEXAMETHYLENETETRAMINE SALICYLATE, SALURENE. $(CH_2)_6N_4.C_6H_4.OH.COOH = 278{\cdot}1724$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in water before meals.

Colourless prismatic crystals with agreeable sweetish saline taste, containing approximately 50% of each constituent. Prepared by combining equimolecular proportions.

Soluble 2 in 1 in Water and 1 in 2 in Alcohol.

Uses.—This salt should be especially useful as an urinary and intestinal antiseptic, *e.g.*, in cystitis, bacilluria, gastro-intestinal catarrh, colitis, dysentery, diarrhœa, dyspepsia, and all cases beneficially treated by hexamine—it is exceedingly soluble. It doubtless splits up on passing through the system into its two constituents,—the Salicylic Acid enhancing the effect of the Hexamine.

It does not irritate the bladder like other antiseptics.

B. COLI INFECTIONS OF BLADDER AND KIDNEY.

Alkalinization of the urine should be obtained at earliest possible moment. Where this failed urinary antiseptics often successful. Hexamine Salicylate seems best.—J. Ferguson, B.M.J. i./22,57.

An elderly medical man, a sufferer from chronic cystitis for 5 years, informs us that he took 500 Vesalvine Tablets with remarkable benefit. After about 3 days, taking 9 a day, the urine became odourless, but remained slightly cloudy and contained a few 'shreds,' though nothing like as bad as before commencing the tablets. He found them more efficacious if swallowed whole and the tablets did not disagree with him. Vesalvine 'S' in his opinion, is the only medicine that has given him any relief, though he had tried a great many vaunted cures. It was found later that 2 tablets 3 times a day were equally efficacious on continuing the treatment.—H. A. Baines, July, 1931.

Note.—Though so markedly soluble in water there apparently exists a state of dissociation in solution, for example, Solutions of strength 1%, 3%, 6%, 12%, 25%, 50% and saturated remain clear for months, whilst vigorous rubbing on the sides of the vessel will cause a deposition of Salicylic Acid crystals.

Analysis.—Estimate Salicylic Acid content by titrating with N/10 Sodium Hydrate, using Phenolphthalein as indicator. 1 Gm. should require not less than 34 Cc.

Incompatible with acids, alkalis and carbonates, also with Sodium Salicylate—it throws the Salicylic Acid out from same—and otherwise as Salicylates, hence best administered as such, not in a 'mixture.' It decomposes on heating in water or alcohol.

Vesalvine 'S' Tablets 5 grains and **Cachets** 5 and 10 grains also **Elixir Vesalvine 'S'** 5 grains in 1 drachm, are prepared.

Hexamethylenetetramine Camphorate. *Syn.* ✱ **Amphotropii** (T.M. 338474) $[(CH_2)_6N_4]_2C_8H_{14}(COOH)_2$=480·376.

Dose.—8 to 12 grains (**0·5 to 0·8 Gm.**). Tablets 8 grains (**0·5 Gm.**

A white crystalline powder made by combining in Alcohol, Chlorc form, etc. Subject of patent 21728/12—now *lapsed.*

Soluble in water 1 in 10 with acid reaction. Solutions ar hydrolysed to a great extent.

Uses.—Urinary antiseptic. An alkaline urine is rendered neutra or acid by administration. In chronic cystitis, bacteriuria, nephriti

Hexamine-Sodium Acetate, *Syn.* ✱**Cystopurin** (T.M. 288836 $(CH_2)_6N_4.2CH_3COONa+6H_2O$=412·261.

Contains approx. 34% of Hexamine. **Cystoformin** is similar.

Dose.—30 grains (**2 Gm.**). A crystalline salt made by evaporating solution of the components in the above proportions. In gonorrhœa and cystitis.— **Tablets** contain **1 Gm.** (15 grains).

✱**Urodonal** (T.M. 361117 and 306349). A granular effervescent preparatic of Hexamine with small amounts of Sidonal and Lysidine.

Dose.—3 teaspoonfuls during the day. The three components are state to be useful in removing uric acid and allied bodies.

✱**Felamine** (T.M. 396797). ✱**Sandoz** (T.M. 439637).

Syn. HEXAMINE GLYCOCHOLATE.

Cholagogue and biliary antiseptic. In catarrhal jaundice, constipatic and enteritis and in the after-treatment of typhoid fever and for gallstone Tablets contain 5 grains (**0·3 Gm.**).

HYDRARGYRUM.

Hg=200·61.

Antidotes to Acute Poisoning by Mercuric Salts.—Emetics by mouth, Apomorphine hypodermically; whi of 1 egg for every 4 grains of Perchloride (avoid excess), or mill reduced iron; alcohol or ether for collapse; and opium for pai

Uses.—Purgative, cholagogue and antisyphilitic.

Purification of Mercury. Allow it to flow in a thin stream throug a long column of Nitric Acid. Wash and filter through chamois leather.

Hydrargyrum cum Creta (*B.P.* '14). *Syn.* **Grey Powder.**

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). Slipule No. 5 holds 1 grai

Contains 33⅓% Mercury. Liable to oxidise in the air. That U.S. X. is prepared with Mercury 38, Clarified Honey 10, and Pr pared Chalk 57. Moistened *q.s.* and dried—has sweet taste and somewhat damp.

Injectio Hydrargyri Intramuscularis "10%." *Syn.* INTR MUSCULAR INJECTION OF MERCURY. F. J. Lambkin's origin formula.—B.M.J. ii./05,1257,1348.

Mercury 1 ounce (troy), Anhydrous Lanoline 4 ounces, Liqu Paraffin (Carbolised 2%) to 10 ounces (by volume).

Dose.—This contains 1 *grain in* 10 *minims,—the maximum do once a week. Physicians should specify* '10%' *using the abc name in full to prevent confusion with stronger preparations.*

Sterules, Hypodermic, are prepared containing 10 minims.

Site of Injection.—An area around a point midway betwe

the gluteal cleft and the anterior superior iliac spine is best.—G. Pernet. *Sterilise Syringe in Liquid Paraffin.*

Experiments which we conducted showed that this suspending mixture is probably as useful as any. It holds up the mercury even in hot weather—of great importance for accurate dosage. We compared it *inter alia* with formulæ containing Cocoa Nut Fat and Paraffin Oil, but came to the conclusion that they were no improvement. Some preparations yield a heavy precipitate at tropical heat.

The preparation is slowly absorbed and practically painless. Diarrhœa, if caused by the injections, may be warded off by 5 grain Cachets of Bismuth Salicylate.

P. Off.—Heat Wool Fat 50 and Olive Oil 23 separately at 150° C. for 1 hour and cool. Triturate Mercury 10 with 10 of the Wool Fat in a sterile mortar adequately, then incorporate the rest of the wool fat. Add Camphor 10 previously dissolved in Creosote 10 and then the Olive Oil. Mix. We find this formula quite satisfactory.

Before using Mercurial Cream, *weekly* injections of **Calomel Cream** containing 5% Calomel in the same vehicle have been suggested. *Dose.*—10 minims = ½ grain of Calomel. *cf.* also **Injectio Hydrargyri Subchloridi Hypodermica.**

No Salt of Mercury comes up to Calomel for removing active signs of syphilis, but the effect is only transitory in comparison with metallic Mercury (¾ grain of Calomel is given once a week for four weeks and *then* metallic Mercury). Calomel suspended in Olive Oil is exceedingly painful. The addition of Creosote and Camphor produces analgesia—and can be given with impunity.

Contraindications. Old people, broken down Alcoholics, those with renal disease, with Albumin in the urine, tubercular subjects, those with lead poisoning and gouty persons should not have the treatment.

Injectio Hydrargyri. — Staff Surgeon Adams' Formula. Royal Navy Formula (G. B. Scott, Roy. Com., on Venereal Diseases). *Syn.* Cremor Mercurialis Mid. H.

Dose.—5 minims (=1 grain of Mercury) given once a week. Mercury 20, Anhydrous Lanolin 30, Chlorbutol 2, all by weight, Liquid Paraffin to 100 by measure.

Huile Grise, Fr. Cx., Ph. Ned. V. *Syn.* Grey Oil, Oleum Cinereum.

Dose.—An injection of 2 to 3 grains (**0·12 to 0·2 Gm.**) = ⅔ to 1 grain Mercury approx. (**0·04 to 0·06 Gm.**), every eight days for 5 or 6 weeks—or up to seven divisions of the Barthelemy's syringe (*v. infra*), *i.e.*, **0·07 Gm.** Mercury.

Mercury 40, Wool Fat 26, Vaselin Oil (Fr. Cx.) 60—all by weight. Measures 100, *i.e.*, 40% w/v. Mercury (**0·4 Gm. in 1 Cc.**). Ph. Ned. V. and P. Belg. IV. is similar. Fr. Cx. gives method of sterilising.

F.E. VIII. is elaborate, made with Chloroform and contains Castor Oil, with Guaiacol and Camphor as preservatives.

Barthelemy's Syringe (used in France) is graduated so that when used with a 40% *w/v.* Grey Oil, 1 cgr. of Metallic Mercury is contained in each of its divisions ; 14 cgr. or approx. 2½ grains in the syringe-full.

Fournier's Syringe is ½ Cc. in capacity divided into 10 on the barrel so that each division represents 2 cgr. of Mercury using the 40% *w/v.* product.

Levy-Bing-Lafay-Syringe has piston rod graduated into 15 divisions, each of which represents 1 cgr. using the above.

A 10% *preparation, e.g.*, the **Injectio Hydrargyri Intramuscularis** at the commencement of the chapter, is preferable.

Suppositories containing the 40% Grey Oil in various strengths have been used in syphilis. Efficacious, simple and safe.

Intravenous Injections of Mercurials are painless, have small dose, a certain of absorption, rapid of action, and do not salivate.

Difficulties of the method, of obtaining consent of patient, possible thrombosis, pyæmic infarction, necessary daily injection. Violent dysentery diarrhœic symptoms or polyuria and even albuminuria may result.

Solutions of mercuric cyanide, 20 minims of 1% solution (*i.e.*, $\frac{1}{5}$ grain oxycyanide, biniodide, succinimide and perchloride have been used.

Linimentum Hydrargyri (*B.P.* '14).

Useful stimulant for enlarged joints and glands.

In affections of the peritoneum, involving the lower quadrants of the abdomen or pelvis, Mercury is without rival. In appendicitis Mercury inunction reduces the pain, mitigates thirst, and effects copious evacuation and urination, also suitable in all cases of infection of the peritoneal serous membrane.

Pilula Hydrargyri (*B.P.* '14), **Blue Pill.** *Dose.*—4 to 8 grains **(0·25 to 0·5 Gm.).**

Contains 33% Mercury by weight.

In raised arterial tension when indicative of danger, a pill twice or thrice weekly, followed by Saline is beneficial.—Brunton.

In syphilis, begin with 3 grains a day after the first and last meal, increasing the daily dose by 1 grain each week till patient is taking 2 grains thrice daily. An average dose is 2 grains twice a day.

In cardiac dropsy it seems to act complementarily to digitalis and to prove efficient where latter has failed to increase urinary secretion materially. It is to be avoided if renal disease be present. When diuresis is fully established discontinue Mercury and give a mixture of Caffeine and Spirit of Nitre with Infusion of Broom Tops.

Has good soporific effect in forms of biliousness where sleeplessness is prominent symptom.—W. J. Tyson, Clin. Jl., Aug. 8, '23,382.

✱**Mercurol** (T.M. 228096) (*cf.* **Nargol.**)

A combination of Mercury with Nuclein. Used for gonorrhœa injections $\frac{1}{2}$ to 2% solutions in syphilis in 2 grain doses.

Unguentum Hydrargyri (*B.P.* '14).

Mercury 30%, as required by F.I. Principally used for inunction in syphilis. To relieve local inflammation and to destroy pediculi.

Fr. Cx. (*Onguent Napolitain*). Mercury 1, Benzoated Lard 2.

U.S.—Mercury 50, Oleate of Mercury 2, Suet 23, Benzoated Lard 25.

P. Svec. Contains **Hydrargyrum Exstinctum** 36 (*i.e.*, Mercury 'killed' by rubbing with Wool fat and containing 83·5% Hg.), Benzoated Lard 44, Suet 20, *i.e.*, about 30% Mercury.

Unguentum Hydrargyri Mite (Dilutum). U.S. X. Mercuri Ointment (U.S.) 60, Petrolatum 20, 'Unguentum' 20. *This is therefore an approx.* 30% *Hg. preparation—cf. B.P.C. infra.*

Inunction treatment of syphilis.—5 Gm. is an initial dose a 33% Ointment. ***Caution.***—Directions for treatment of gingivitis if this occurs. Paint with 10% Chromic Acid, or stronger up to even 75%. Give Mineral Waters—Aix la Chapelle, Uriage, Harrogate, etc.—D. Freshwater.

Unguentum Hydrargyri Compositum (*B.P.* '14). Mercury Ointment 10, Yellow Beeswax 6, Olive Oil 6, Camphor Flowers 3. This is *Scott's Dressing, modified.*

For enlarged glands, chronic synovitis and syphilitic nodes. Swelling of the ankles is well treated with it.

Unguentum Hydrargyri Mite, B.P.C. *Syn.* **Blue Unction.** Mercurial Ointment 1, Lard 2. Mix. For destroying lice. *This contains* 10% *Hg.—cf. U.S. antea.*

To promote the removal of the effusion of pleurisies, the rubbing into the chest of half a drachm of Mercurial ointment twice daily is often useful.—Burney Yeo.

Lanolinum Hydrargyri.

Mercury 100, Lanolin (Hydrous) 200, Mercurial Ointment 5, Mutton Suet 50. For inunction in syphilis (effect is rapid); used daily 4 to 8 times after a hot bath.

The idea of using the various fats (wool fat, mutton suet and the lard—in the Mercurial Ointment) was to favour absorption—reference to Liebreich's work and a paper by A. S. Gubb to the M.P.C., 1886.—P.J. i./21,516.

Inunction *at night* probably prevents pullulation of the spirochaete on the surface of the body—a habitat which these organisms find particularly favourable for perpetuation of their species by transmission to another individual. *Sp. Pallidum* appears to swarm at night in the tissues of indurated chancres, at any rate.

In hospital practice (army), inunctions and baths for in-patients, with weekly grey oil injections for out-patients, gave satisfaction.—L. ii./11,1386.

Scleroderma with obstinate callous ulcers on the legs has improved under mild Mercurial inunctions.

One thorough course of inunction of Unguentum Hydrargyri $\frac{2}{3}$ drachm in Lanolin or other base $\frac{1}{3}$ drachm, in the early stages (first six months) of syphilis is of inestimable value. Requires care, but mortality is small.—Maj. French.

Discussion on the Treatment of Tabes Dorsalis.—Syphilis the important ætiological factor without which there would be no such disease as tabes. Inunctions or injections were superior to Mercury by the mouth, and perhaps better by inunction than by injection.—B.M.J. ii./10,1249. Pseudo-tabes—the result of syphilitic meningitis—treated by inunction.—B.M.J. i./09,1403.

Absorption of Mercurials from Ointments applied to the skin.—The method was to rub a weighed quantity into 20 square inches of surface, and ascertain the amount not absorbed. The greatest absorption of mercury took place from a lard basis. Hydrous wool fat was absorbed to a greater extent than lard, but the mercurial was not absorbed with it, so the absorption of mercury was actually less than from a lard ointment of equal strength. Absorption from a ***paraffin basis*** was always ***less than from a lard base.*** Of the various mercurials examined, mercuric oxide was the most readily absorbed either as such or in the form of the official oleate, but ointments containing over 10% of the oxide are irritant. Ammoniated mercury and mercury salicylate are absorbed almost as well as the oxide. Mercurous chloride was absorbed to a less extent than any of the mercurials examined. The inunction of ***4 Gm. of Mercury Ointment B.P.*** gave an absorption into the body not exceeding ***0·12 Gm. of Mercury*** when used for 2 minutes and 0·17 Gm. in 10 minutes.—R. B. Wild and Ivy Roberts, B.M.J. i./26,1076.

See also our experiments with a variety of Ointments under Methyl-Aspriodine. In no instance were we able to trace that the chemicals were promptly excreted in the urine.

Mercury Amalgam.

This is one of the most popular of dental fillings. Black (*Cosmos*) suggests: Silver 68·5, Tin 25·5, Zinc 1, Gold 5.

In use, the alloy is worked up in a glass mortar with an equal quantity of Mercury, and the excess of Mercury is squeezed out immediately before filling in. It is the general rule to employ a double filling, *i.e.*, to insert an initial filling of zinc oxy-sulphate or oxy-phosphate, *q.v.*, and afterwards an amalgam when a metal filling is employed, and where depth of the cavity will allow.

Amalgam fillings of teeth may cause Mercury poisoning in susceptible people.—L. i./26,1275.

℗**Hydrargyrum Ammoniatum** (*B.P.* '14). **U.S. X. P. Dan. P. Svec. X., Ph. Ned. V., P. Belg. IV.** (Précipité Blanc).

Mercuric Ammonium Chloride, $Hg.NH_2Cl=252{\cdot}0906$. **White Precipitate.** A white powder, insoluble in water but soluble in hydrochloric acid.

℗**Unguentum Hydrargyri Ammoniati** (*B.P.* '14).

Strength 5% in Benzoated Lard.

Benzoic Acid in the Benzoated Lard causes a faint yellow tinge; plain lard does not cause the colour.—H. Stout, P.J. i./17,187.

In pruritus and other skin affections.

℗**Unguentum Hydrargyri Ammoniati Dilutum, N,H.W.** Equal parts of the B.P. 1898 ointment, (1 in 10 of Paraffin Ointment) and soft paraffin (white).

Pustular eczema, resulting from pediculosis capitis in weakly children, is well treated with equal parts of this ointment and olive oil, enclosing the head in an oiled paper cap.

℗**Unguentum Hydrargyri Ammoniati, U.S.**

Ammoniated Mercury 1, Liquid Paraffin 1, Hydrous Wool Fat 1, White Petrolatum 4.

A wet process of making.—P.J. i./22,379.

Tinea circinata can be rapidly cured by this ointment.

Unguentum Prophylaxis. For prophylactic measures against syphilis. Metchnikoff suggested the use of Lanolin Ointments containing ℗ White Precipitate 25% or Calomel 25%, or [℗ 1] Mercury Salicyl Arsenate (*q.v.*) 25%. (*Physicians should specify which is required when prescribing Unguentum Prophylaxis.*) These are less irritating than Mercurial ointment. To be used by inunction from 4 or 5 minutes after coitus.

For use in the Navy—Calomel Ointment 33% made with Lanolin; 50% strength also mentioned in the same paper.

Medical men, students, and nurses advised to have the ointment handy to apply to any suspicious crack about the fingers, etc.

Early application of an ointment of Calomel 10 and Lanolin 20 is said to have prevented syphilitic infection by killing the Treponema.—L. ii./11,138.

Capsungs of the ointment, with elongated points to be torn off, and 'Collapsubes' of the ointment are prepared.

Unguentum pro Eczema, N.H.W.

Ammoniated Mercury 10 grains, Lead Acetate 10 grains, Zinc Oxide 20 grains, Mercuric Nitrate Ointment 20 grains, Soft Paraffin ½ ounce, Lard ½ ounce.

℗**Cremor Lowndes.**—Ammoniated Mercury Ointment 1, Zinc Ointment 1, Glycerin 2, *misce s.a.*—Squire.

Black Precipitate $NH_2Hg_2Cl.=452{\cdot}7006$. Formed when Ammonia Solution is added to Calomel. The substance is regarded by some as a mixture of White Precipitate NH_2HgCl and metallic Mercury.—P.J. ii./21,260.

Hydrargyri Benzoas. **Mercuric Benzoate.** Fr. Cx.
$Hg.(C_6H_5COO)_2.H_2O=460{\cdot}7036$.
Dose.—$\frac{1}{50}$ to $\frac{1}{10}$ grain (**0·0013 to 0·006 Gm.**).
A white crystalline powder, practically insoluble in cold water, ***soluble*** with addition of Salt as below, also about 1 in 180 of Alcohol 90%.
Hypodermic injection.—A daily dose of 1 to 2 Cc., rising to 5 Cc., of a 1% solution, made with the aid of 0·75% Sodium Chloride in water: in preference with the addition of 0·75% to 1% of Cocaine Hydrochloride. Or weekly, 0·25 Gm. in 10% Paraffin Suspension.
Uses.—For treatment of syphilis.
Intramuscular injections have been given in uterine hæmorrhage. Septicæmia, pyæmia, erysipelas, puerperal fever, septic sore throats treated by Mercury Benzoate Injections—10 Cc. of 1% Solution (1·5 mgr. per kilo weight). If repeated the body attains a resistance against *Strepto* infections, while smaller doses inhibit the generalised growth of the Cocci. The method can be used in all septic conditions provided it is applied before the invasion is too extensive or widespread. It is prophylactic rather than curative. It had been observed that mothers taking Mercury shortly before or during childbirth did not suffer from puerperal infections even though the conditions were most unhygienic, also that syphilitics undergoing mercurial treatment do not catch the ordinary infective diseases.—B.M.J.E. ii./13,79.
Fr. Cx. gives mode of preparation, employing Yellow Mercuric Oxide, Acetic Acid (glacial), and Sodium Benzoate.

Hydrargyri Bromidum. Mercuric Bromide. $HgBr_2=360{\cdot}442$.
Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**). Silvery Scales.
Soluble 1 in 250 of Water, decomposes on boiling.
In syphilis, in solution with Sodium Bromide thus,—Mercuric Bromide 1·8 Gm., Sodium Bromide 1·03 Gm., Water 100 Cc. is employed in dose of 1 to 2 Cc. of the solution (=0·01 to 0·02 Gm. Hg.) intramuscularly into the buttock. A platinum-iridium needle is essential. Some pain may be caused.

Hydrargyri Carbolas. **Phenol Mercury.**
$Hg.(C_6H_5O)_2.H_2O=404{\cdot}7036$.
Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) daily.
A whitish amorphous powder, obtained by double decomposition of mercuric chloride and an alcoholic solution of phenol in caustic potash.

℗ **Hydrargyri Cyanidum.** **Mercuric Cyanide, Cyanuretum Hydrargyri** Fr. Cx.; P.G. VI. **P. Belg. IV.** $Hg.(CN)_2=252{\cdot}626$. (Mercurous Cyanide is not known.)
Dose.—$\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**). Fr. Cx. has *max. single dose* $\frac{1}{6}$ grain, max. during 24 hours $\frac{5}{8}$ grain approximately.
Intravenous Dose.—1 Cc. of 1% Solution considered a max. single but more has been given, *see Intravenous Dose Table et infra.*
White or colourless, prismatic crystals. ***Soluble*** 1 in 12 of water and 1 in 4 of glycerin. It is not decomposed by alkalis; it is used as a lotion to syphilitic sores, and given in pills of $\frac{1}{10}$ grain twice daily. Used in diphtheria, $\frac{1}{250}$ grain frequently, with 1 minim Tincture of Aconite in honey, employing also a gargle, 1 in 10,000.

In syphilis 20 minims of 1% solution daily with caution. Has also been used intravenously. This dose given alternate days. It has been advised for persistent cerebral headaches of the secondary period.—L. ii./12,361. *Intramuscularly* relatively painless but may cause diarrhœa and albuminuria.

If given ***intravenously*** as in combined Organic Arsenic and Mercury treatment of syphilis, care must be taken to give strictly intravenously and not intramuscularly or hypodermically.

Sterules contain $\frac{1}{12}$ grain (0·005 Gm.) in 1 Cc. also $\frac{1}{6}$ grain (0·01 Gm.) in 2 Cc.

SYPHILIS.—One injection of one of the Salvarsan substitutes and five injections of 1% Cyanide solution per week. Doses of the latter varied with tolerance of the patient, and it was found that many patients could stand 40 to 50 m. Superior to other routine methods.—J. Ernest Lane, L. ii./21,796.

Syphilis, nasal and aural, treated by 1 Cc. of 1% solution intravenously. Much used in France. May occasion diarrhœa.—D. Guthrie, Pr., Feb., '20,131.

ACUTE SYPHILITIC NEPHRITIS. Albuminuria disappeared after 15 days' treatment with intravenous injections of 0·005 to 0·02 Gm., thus rendering possible the use of Arsenic and Bismuth, which were previously contraindicated.—Petges, Jl. A.M.A. i./29,1488.

℞ **Injectio Hydrargyri Cyanidi, Plaistow.** *Dose.*—2 to 10 minims. For subconjunctival use. 1 in 5,000 of water.

Subconjunctival injections of 20 minim doses of 1 in 4,000 solution will cure commencing senile cataract. Pain is very severe, lasting 3 or 4 hours. Patient should be under light chloroform anæsthesia.

Metastatic ophthalmia treated by, also given intramuscularly.—Pres. Feb. 21, p. 74.

℞ **Pasta Hydrargyri Cyanidi.** 1 in 500 in Tragacanth basis for smearing on catheters.

℞ **Hydrargyri Oxycyanidum,** $HgO\ 3[Hg(CN)_2] = 974{\cdot}488$.

Dose.—1/16 to 1/6 grain (**0·004 to 0·01 Gm.**) *per os.*

Intravenously 1/6 grain (**0·01 Gm.**) in 75 minims (**5 Cc.**) or less, has been given in syphilis.

Chemical Composition.—According to **P.G. VI.** must contain 33·6 to 35·2% [$Hg(CN)_2.HgO$] equivalent to 15·37 to 16·25% Mercuric Oxide and 84·6 to 83·8% of total Mercury Cyanide. It is a mixture of approx. 34% Mercury Oxycyanide and 66% Mercury Cyanide.

P. Svec. X. is a mixture of the Oxycyanide $Hg(CN)_2HgO$ and Cyanide containing 30 to 40% of Oxycyanide.

The compound, from the point of view of irritating effect on the tissues and its failing to attack surgical instruments, should in preference be the crystalline body of the above formula and not $HgO\ Hg(CN)_2$. P. Helv. gives the latter formula but the characters and tests agree rather with the compound $HgO\ 3[Hg(CN)_2]$. P. Belg. IV. also contains the two compounds.

Danger of explosion in manufacture.—$HgO\ Hg(CN)_2$, sometimes called the normal Oxycyanide, is dangerous to heat. The other compound is not.—F. C. J. Bird, P.J. i./23,383. See also J.C.S.A. i./1922,640.

Solubility.—This varies with the proportion of HgO present. We found a commercial sample, of the variety preferred, to be soluble 1 in 17 with a small amount of residue.—1924.

The pure salt, *i.e.*, the normal compound (*antea*), was found to be soluble in 85½. 'Trade' Oxycyanides vary.—A. J. Jones, P.J. ii./20,87; i./23,127; see also Comey and Bahn's 'Dictionary of Solubilities.'

Uses.—In the treatment of syphilis during first week 0·05 Gm. in pill *pro die* as an average has been given—to be taken when the stomach is full. Should not be used with Potassium Iodide.

As a wound lotion 0·2 to 0·6% solutions have been employed.

1 in 5,000 to 1 in 10,000 as bladder irrigant—in eye work 1 in 1,000 to 1 in 5,000—and 1 in 200 for instruments, which it is said not to attack.

Gonorrhœa treated by irrigation with Mercury Oxycyanide, 1 in 2,000, also Potassium Permanganate, 1 in 6,000 for acute, to 1 in 2,000 for chronic cases.—H. J. Blakesley, B.M.J. i./21,619.

A stock solution of mercury oxycyanide 1 in 30 may be made. One drachm of this to 1 pint of water a good irrigant for the urethra. —F. Kidd, B.M.J. i./24,698.

℗1 **Mercury Oxycyanide Solubes** are prepared 0·2 Gm. each, 1 in 2 litres gives 1 in 10,000 ; 1 in 1 litre—1 in 5,000 ; 1 in 40 Cc. 0·5%.

℗1 **Mercury Oxycyanide Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint makes 1 in 1,000 solution, to 1 quart makes 1 in 2,000 solution, 1 in 5 pints makes 1 in 5,000 Solution.

0·2 Gm. per litre (1 in 5,000) as a lotion for cleansing the glans and meatus prior to lavage in gonorrhœa.—Pr., Oct., '10, p. 417. *Iodides should be excluded from a patient so treated.*

Mercury Oxycyanide is good against Staphylococcus, but is an indifferent gonocide.—H. D. L. Spence, L. i./30,19.

Lotio Hydrargyri Oxycyanidi, R.O.H.

1/8, 1/10, 1/16, or 1/20 grain in Water 1 ounce.

Hypopyon ulcers treated by subconjunctival injections.—T. L. de Courcy, B.M.J. ii./21,737 *Cf.* Injectio Hydrargyri Cyanidi.

℗1 **Pasta Hydrargyri Oxycyanidi, L.H.**

Mercury Oxycyanide 24 grains, Tragacanth 192 grains, Glycerin 4 ounces, Water to 20 ounces.

A proposed **anti-venereal prophylactic** consists of Mercury Oxycyanide 0·66 Gm., Potato Starch 40 Gm., Glycerin 50 Cc. and water to 500 Cc. The jelly formed should be heated on a water-bath for 1 hour. Stated to have a coefficient greater than 1 in 3 Phenol.—J. L. Priston and R. C. Frederick, Jl. R.N.M.S., Oct., '26,283.

℗1 **Mercuro-Zinc Cyanide.** Lister's Antiseptic. A white powder usually supplied tinted with **Rosalane** (Mauveine Hydrochloride), obtained by precipitation from a cold saturated solution of the cyanide of mercury and potassium by adding a cold saturated solution of zinc sulphate in equi-molecular proportions, or by adding in similar solutions mercuric chloride to zinc and potassium cyanide. The maximum percentage of mercuric cyanide found is 38·5, and the body may be described as a trizincic monomercuric octacyanide—

$Zn_3\ Hg(CN)_8 = 604{\cdot}814$.

It should contain at least 20% Mercury Cyanide, $Hg\ (CN)_2$. If carefully made can be produced containing 25%.

Estimation process by reduction with hypophosphorous acid.—D. B. Dott, P.J. i./13,98 ; C.D., Jan. 25, '13.

Lister—The Investigator and Surgeon.—Following on Lister's migration to London (and the Carbolic Spray day), he tried many gauzes treated with preparations of Mercury, but they had to be discarded on account of irritation, until the Double Cyanide of Zinc and Mercury was suggested (by the late W. Martindale). This is unirritating and is effective.—W. Watson Cheyne, B.M.J. i./25,923.

Lister first used (undiluted) carbolic acid in an operation on August 12th, 1865. Many other antiseptics achieved temporary popularity. Lister tri[ed] the Mercurial Salts and in February, 1886, the late William Martindale [sug]gested to Lord Lister Mercuric Cyanide. Lister subsequently tried M[ercuro-Zinc Cyanide].

and Potassium Cyanide, but this, in common with others, was irritating. Finally the late William Martindale suggested the double Cyanide of Mercury and Zinc which gave Lord Lister entire satisfaction.—"Chemicus," P.J. ii./15,325. See also B.M.J., Feb. 18, '93, and B.M.J. i./07,795.

A Link with Lister.

Harvey G. Kay, John C. Umney and James Hunter, assisted the late W. Martindale in the pioneer work of devising a press for the even distribution of Sal Alembroth, 'Cyanide' and other antiseptics in the dressings, working under the personal supervision of Lord Lister at 10, New Cavendish Street, London, W.—W. H. M., P.J. i. 27,616.

Lister Centenary, Edinburgh, 1927.—B.M.J. ii./26,703.

See also Special No. of B.M.J., April 9, '27, p. 653, and L. i./27,773—786.

Upton House, Eastham, as it was in Joseph Lister's childhood. He was born there in 1827.—L. i./30,51.

The **Lister Ward at the Glasgow Royal Infirmary** was ***pulled down—there never was in the world's history an act of greater vandalism.*** The Managers of the Board of the Infirmary were not unanimous, one-third of those who attended the meeting did not approve.—A. Freeland Fergus, B.M.J. ii./30,448. See also Lord Moynihan, Can. Supplement to the B.M.J. ii./30,10.

Glasgow the cradle of antiseptic surgery. There also, was probably the first change to the modification known as aseptic surgery—under William Macewen. —A. Freeland Fergus, B.M.J. ii./30,843.

Solubility.—Very slightly in water, more so in dilute acids.

Sterilisation.—It is unnecessary to sterilise Double Cyanide Dressings.

℞ **Mercuro-Zinc Cyanide Gauze** 3%, is a popular dressing for applying direct to wounds. It is not so irritant as some of the other mercurial dressings and has the advantage of keeping well without the mercurial salt becoming reduced by the cotton. It is supplied in 1, 2, 6 and 12 yard pieces and with **cotton wool tissue** in 1 lb. packets. It is damped before use with 1 in 20 Carbolic Acid solution. **Cotton wool,** as also bandages, contains 3%.

For suppurating abrasions, boils and skin affections in war *Dry* Cyanide Gauze covered completely with plaster excellent and rapid. No solution or other antiseptics used.—G. Home, B.M.J. i./16,14.

For visible clean wounds it is good. To be removed by Hydrogen Peroxide when too adherent.—Casualty Clearing Station experience. —A. Don, B.M.J. i./16,648.

℞ **Mercuro-Zinc Cyanide Cream** may be made by triturating the powder with carbolic lotion, 1 in 20, *q.s.*, for applying to hairy parts adjacent to wounds.

℞ **Mercuro-Zinc Cyanide Paste.** Mercuro-Zinc Cyanide 400, Tragacanth 2, Phenol 20, Water 800, mix. For a first dressing for wounds. *Caution*: *Not to be supplied in metal tubes—especially lead. The paste must be rubbed on in as thin a layer as possible.*

℞ **Lotion of Mercuro-Zinc Cyanide** of strength 1 in 5,000 to 1 in 1,000, is used for wounds. *Caution*: *Shake bottle—not dissolved.*

℞ **Unguentum Hydrargyri et Zinci Cyanidi; R.O.H.** 1 or 2 in 100 of Soft Paraffin or Lanolin. For syphilitic sores and eczema, also excellent for burns and for granular eyelids. *Caution*: *Not in collapsible tubes.*

℗ **Hydrargyri Iodidum Rubrum** (*B.P.* '14). *Syn.* **Mercury Biniodide, Mercuric Iodide,** HgI_2=454·474.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**). Fr. Cx.: *Max. single dose* $\frac{1}{3}$ grain; max. during 24 hours $1\frac{1}{4}$ grains approximately.

Intravenously.—$\frac{1}{12}$ grain (0·005 Gm.) in 75 minims (5 Cc.) is usual, but $\frac{1}{2}$ grain (0·03 Gm.) in 150 minims (10 Cc.) has been given. —*See* R. L. Spittel's formula.

Ⓟ **Pills and Tablets** contain $\frac{1}{50}$, $\frac{1}{36}$, $\frac{1}{24}$, $\frac{1}{16}$, $\frac{1}{12}$, and $\frac{1}{8}$ grain.

Red powder or crystals, ***soluble*** in solutions of other iodides, and in solution of mercuric chloride, forming double salts *cf.* Mercuric Potassium Iodide ; also 1 in 25 of castor oil, or 100 parts of the latter will dissolve 8 of this iodide with 5 of perchloride of mercury, about 1 in 200 ether, in alcohol 1 in 300.

Uses.—A powerful antiseptic, less irritant than Mercuric Chloride. As a lotion for the hands or eye wash 1 in 5,000. For wounds 1 in 7,000, vaginal douche 1 in 10,000.

Mercuric Iodide Estimation by dissolving in Sodium Thiosulphate solution (Eder and Ulm's observations).—J. Sandilands, P.J. i./26,357.

Ⓟ **Unguentum Hydrargyri Iodidi Rubri** (*B.P.* '14). Strength 1 in 25.

For tinea may be applied to small spots, but not to large surfaces. Too strong for general use on the skin. Exophthalmic goitre has been treated by daily use of this ointment half strength.

PARENCHYMATOUS GOITRE treated by dilute Mercuric Iodide Ointment locally. Improve patient's general condition and comfort.—D. J. Harries, B.M.J. i./23,555.

Ⓟ **Injectio Hydrargyri Iodidi Rubri Hypodermica** (RAGAZZONI).

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Mercuric Iodide 1 grain, Sodium Iodide *q.s.*, in 64 minims.

In syphilis can be used in large doses, but is painful.

Ⓟ **Sterules Hypodermic**, contain $\frac{1}{12}$ grain in 8 minims for a dose.

Ⓟ **Injectio Hydrargyri Iodidi Intravenosa** (R. L. SPITTEL).

Dose.—120 to 180 minims (**8 to 12 Cc.**).

Mercuric Iodide 3·24 Gm., Sodium or Potassium Iodide 28·42 Gm., N/1 Sodium Hydrate Solution 40 drops or *q.s.*, Water to 1,000 Cc. The solution is rendered carefully neutral using Phenolphthalein, the soda being added last. Often a single injection will produce an effect as phenomenal as Salvarsan. Used in conjunction with latter in syphilis.—L. i./20,378. *Caution.—An average dose of this contains* 0·03 *Gm.* ($\frac{1}{2}$ *grain*). The amount of caustic soda in the formula in the *Lancet* paper was unnecessarily large ; we have given the amount needed, after experimenting.

Ⓟ **Collapsible Tubes** of Mercuric Iodide Ointment 1% with catheter attachment are useful for the treatment of gonorrhœa.

Ⓟ OLEUM HYDRARGYRI BINIODIDI *Syn.*—HUILE D'IODURE MERCURIQUE. FR. CX.

Dose.—15 minims (**1 Cc.**) containing approx. $\frac{1}{16}$ **grain (0·004 Gm.)**

Mercuric Iodide 4, Olive Oil purified and sterilised, 920 by weight. Dissolve at not exceeding 60° C.

℞ **Pilula Arsenii et Hydrargyri Iodidi.**

Dose.—1 or 2, two or three times a day.

Arsenious Iodide, Mercuric Iodide, of each 1 grain, Distilled Water *q.s.* to dissolve, Sugar *q.s.* to make 12 two-grain pills (or **1 Gm.** of each Iodide in 180 pills). May be combined with 2 grains of Iodide of Iron.

Ⓟ **Wool, Mercuric Iodide.** $\frac{1}{4}$%.

Impregnate Absorbent Wool 400 under pressure with a Solution of Mercuric Iodide 1 and Potassium Iodide 1, and spread out to dry.

℗ **Hydrargyri et Potassii Iodidum.**
HgI_2KI, $1\frac{1}{2}$ H_2O=647·5294.

MERCURIC POTASSIUM IODIDE, commonly known as '*Biniodide.*'

Antiseptic Mercury Biniodide Lotions for surgical use or Tablets to prepare same must contain the requisite amount of this salt or its equivalent made with addition of Potassium Iodide, q.s., v. infra et **Solubes.**

Dose.—$\frac{1}{10}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**) in pill.

Antidotes.—Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts to encourage vomiting,—later Bismuth and Morphine.

Manufacture.—Dissolve Mercuric Iodide 45, Potassium Iodide $16\frac{1}{2}$ (*i.e.*, approximately equimolecular proportions) in water 30, boiling the mixture for a few minutes, allowing to cool for pure Mercuric Iodide to crystallise out, filter and concentrate the filtrate. Collect the first crop of crystals, rejecting later portions which contain excess of Potassium Iodide. Another method is to use Alcohol 90% 20 instead of the water above mentioned, boil the salts with the Alcohol until almost entirely dissolved and crystallise.

Solubility.—This Salt is not soluble in water except in presence of Potassium Iodide, *i.e.*, sufficient at least to produce the body $HgI_2 2KI$; in other words, the theoretical amount (170 approximately) of Potassium Iodide must be added to 647 (approximately) of the double Salt,—this can be easily shown by experiment, but even an excess of this quantity is desirable in tablet making.

Brought into contact with water, 2 ($HgI_2KI.1\frac{1}{2}$ H_2O) decompose into $HgI_2 2KI$=785·938 and HgI_2 (+Aq.). It is, therefore, impossible to prepare Antiseptic Tablets of this substance alone.

The body $HgI_2 2KI$ is also formed in solution, when three times the weight of Potassium Iodide, as of Mercuric Chloride, are dispensed altogether—theoretically the proportion is 2·45 to 1, thus :—

$$HgCl_2 + 4KI = HgI_2.2KI + 2KCl$$

and this will produce the desired antiseptic effect providing the Potassium Iodide be pure. It makes no difference whether the Potassium Iodide is added to the Mercuric Chloride or *vice versa.*—P.J. ii./06,533,557.

Soluble also in Alcohol 90% 1 in 1 (without decomposition), 1 in 1 in Ether, and about 1 in 2 Glacial Acetic Acid.

For ℗ **Nessler's Solution** *v. Vol. II.*

℗ **Biniodide Spirit Lotion** 1 in 1,000.

Mercuric Potassium Iodide, Potassium Iodide 0·25, 70% Spirit to 1,000. For gonorrhœa dilute solutions are used, also as a pigment or spray for throat in scarlatina and diphtheria.

War Wounds. Acts like hypertonic Saline in producing free discharge and requires frequent changing. Not so painful as iodine.—A. Don, B.M.J. i./16,648.

℗ * **'Solubes' Biniodide.**

Contain the equivalent of Mercuric Potassium Iodide 8·75 grains. One in 1 pint of water forms a solution of the strength of 1 in 1,000—suitable for wounds. For lotions and instruments this may be diluted with from 1 to 3 or more parts of water.

"Mercuric Iodide" Tablets.

Method of analysis and results of examination of a number of commercial

samples, the majority were found deficient whether on basis of $HgI_2KI,1\frac{1}{2}H_2O$ (the requisite basis to our mind), or $HgI_2 2KI$ or HgI_2.—C. E. Sage and S. G. Stevens, C.D. i./32,84.

Ⓟ **Biniodide Lotion 'Sterules'** contain 8·75 grains. One diluted to ½ pint gives 1 in 500 Solution or to 1 pint gives a 1 in 1,000 solution.

If a douche is required in midwifery, 1 in 1,000 Biniodide always used.—A. P. Murtz, L. ii./26,728.

Biniodide should come into its own again in midwifery.—B.M.J. i./30,359.

To our knowledge a 1 in 5,000 Biniodide uterine douche was badly tolerated after confinement. Fluid stools passed with a proportion of blood and some albuminuria. Some persons seem very susceptible to mercury.—R. T. Slinger.

Ⓟ **Lotio Hydrargyri Biniodidi, L. H.**

Mercuric Chloride 3 grains, Potassium Iodide $8\frac{2}{3}$ grains, Distilled Water to 10 ounces. Strength of double salt, 1 in 500.

SEPTIC INFECTIONS OF THE SKIN treated by soaking for 5 minutes in Hydrogen Peroxide 10 vol., then in Mercuric Potassium Iodide (1 in 2,000) for 5 minutes, then dress with the Biniodide, cover with Cotton Wool, but no waterproof protective.—W. E. Waller, L. i./31,185.

Ⓟ **Mistura Hydrargyri Biniodidi,** K.C.H.

Dose.—1 ounce (30 Cc.).

Solution of Mercuric Chloride 30 minims, Potassium Iodide 10 grains, Ammonium Carbonate 5 grains, Decoction of Cinchona (*B.P.* '85) to one ounce.

Ⓟ **U.C.H.** has Solution of Mercuric Chloride 60 minims, Potassium Iodide 4 grains, Water to one ounce. Ⓟ **St. M.'s H.** is identical in strength in Mercuric Chloride. Ⓟ L.H. is Solution of Mercuric Chloride 1 drachm, Potassium Iodide 5 grains, Peppermint Water to ½ ounce, *i.e.*, it is double the strength. **R.O.H.** Potassium Iodide 10 grains, Solution of Mercuric Chloride 1 drachm, Water to 1 ounce.

Uses.—The mercury in these mixtures is more rapidly eliminated than when given alone. The potassium iodide acts as a diuretic.

For the combined mercury and arsenobenzol treatment, *vide* p. 194, also Salvarsan by M. and W. Many authorities now advise this.

Keloid well treated by the mixture.—P.R.S.M., Nov., '10.

Ⓟ **Pilula Hydrargyri Iodidi Rubri** (⅛ grain) **et Potassii Iodidi** (4 grains). *Dose.*—One twice daily.

Ⓟ **Injectio Hydrargyri Biniodidi** (pro vagina).

Mercuric Chloride 8 grains, Potassium Iodide 24 grains, Water to 1 ounce. 1 drachm of this to a pint makes 1 in 10,000 approx.

Ⓟ **Soaps** containing respectively 3, 1 and ½% of Mercuric Iodide are prepared. Useful for eczema, acne, scabies, ringworm and desquamation after fevers.

Ⓟ **Unguentum Hydrargyri et Potassii Iodidi.**

Mercuric Iodide 1, Potassium Iodide 1, Water 13, Lard 35, Hydrous Wool Fat 50.

Hydrargyri Iodidum Flavum. **Yellow Mercurous Iodide.** $Hg_2 I_2 = 655{\cdot}084$. *Dose.*—$\frac{1}{8}$ grain (**0·008 Gm.**).

Prepared by double decomposition between freshly made Mercurous Nitrate and Potassium Iodide. (Must not be confounded with the yellow variety of Mercuric Iodide.)

Pills and Tablets contain $\frac{1}{8}$ grain. Employed in syphilis.

Hydrargyri Iodidum Viride. Green Mercurous Iodide. Mercury Protoiodide.

Dose.—$\frac{1}{6}$ to 1 grain (**0·01 to 0·06 Gm.**) gradually increased to 3 grains. **Pills** contain $\frac{1}{6}$ and $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain, and **Tablets** contain $\frac{1}{8}$ grain,—with opium and pepper to prevent looseness of bowels. ***Incompatible*** with other iodides.

This salt should be kept from the light, be of yellowish-green colour, and contain slight excess of mercury; otherwise, as the late W.M. showed, it is unstable and dangerous.

Hydrargyri Nitras, Mercurous Nitrate.

$Hg_2(NO_3)_2.2H_2O = 561{\cdot}2672$.

In colourless monoclinic crystals, generally damp (from adhering acid) and ***soluble*** in water, or yellow tinted (from basic salt), then not perfectly soluble in water. Used in syphilitic sores, 1 in 30 or more, as a lotion or ointment, and occasionally internally in same dose as mercuric chloride.

Liquor Hydrargyri Nitratis Acidus (*B.P.* '14).

Used as a caustic for syphilitic warts, and lupus.

Urethral injection 1 in 1,000, or more, in gonorrhœa and for syphilitic sore throat as gargle.

The Fr. Cx. dissolves Mercury 100, in Nitric Acid (Fr. Cx.) 165 and Water 35, mixed, with slight heat, and evaporates to 225 (all by weight). Sp. Gr. 2·246.

Unguentum Hydrargyri Nitratis (*B.P.* '14).

Syn. Citrine Ointment. Mercuric Nitrate Ointment.

Contains about 1 of Mercury in 15 of the finished Ointment.

The Mercury Solution, by the B.P. '14 process, consists principally of mercurous nitrate before it is added to the fats. There being also an excess of acid present, the chemical action is thus intensified, and by the time the process is completed, by constant and vigorous agitation, all further chemical action will cease, and the ointment should keep of a good colour for months without generating more gases and thus becoming spongy. Its preparation requires care, skill and attention.

For further details vide Vol. II.

Aurinarium Unguenti Hydrargyri Nitratis contains $\frac{1}{3}$ grain of the official ointment—useful for chronic eczema of the meatus.

Unguentum Hydrargyri Nitratis Dilutum (*B.P.* '14).

Contains 20% of Citrine Ointment.

Found to separate at summer temperature. Mercuric Nitrate Ointment 1, Hydrous Wool Fat 1, Yellow Soft Paraffin 3; Melt the two latter with gentle heat, remove from flame and add the first and stir while cooling. Keeps well.

R.O.H. has 40 grains to 1 ounce (9% approx.) in Soft Paraffin.

In tinea tarsi of great value, employed with a brush to the eyelids, also in chronic eczema, psoriasis, and herpes preputialis.

In pustular eczema after removing crusts this checks further infection, then employ Lassar's paste and soothing lotions.

Unguentum Acidi Carbolici Compositum. V.H.C.
Mercuric Nitrate Ointment 2, Sublimed Sulphur ½, Phenol 1, Sesame Oil 1, Yellow Wax 1. L. H. has Mercuric Nitrate Ointment 2, Carbolic Acid 1, Sulphur Ointment 2.

Unguentum Metallorum.
C.X. 1917.—Mercuric Nitrate Ointment, Lead Subacetate Ointment and Zinc Ointment of each equal parts.—**G.H.** is similar.
Mid. H.—Same as C.X. except Dilute Mercuric Nitrate Ointment in place of Mercuric Nitrate Ointment.
Gt. Northern and King's as C.X.—Except Lead Acetate Ointment in place of Subacetate Ointment.

Guttæ Hydrargyri Nitratis, L.H. (*Aural*). Mercuric Nitrate Ointment 1 drachm, Wool Fat ½ drachm, Olive Oil ½ ounce, Liquid Paraffin to 1 ounce.

Aurinaria are prepared *q.v. antea.*

Nebula Hydrargyri Nitratis, T.H.—Nitrate of Mercury Ointment 20, Soft Paraffin 20, Olive Oil 120, Liquid Paraffin 120. St. Bart.'s H. is 6%.

'Nasal Oil,' St. M's. H. is Dilute Mercury Nitrate Ointment 20 grains, Menthol 2 grains, Lavender Oil 5 minims, Olive Oil to 1 ounce.

Ⓟ **Hydrargyri Peptonas.** Mercury Peptonate.
Dose per os.—½ grain (**0·03 Gm.**) increased with caution, hypodermically $\frac{1}{6}$ grain.
Brown powder containing 10% Mercuric Chloride, soluble in water.
Fr. Cx. gives method of manufacture of a Solution.

℗1 **Hydrargyri Perchloridum.** **Mercuric Chloride, Hydrargyri Chloridum Corrosivum, U.S.**; Corrosive Sublimate, $HgCl_2$= 271·524.
(*In Northern Ireland a* ***preparation*** *of Mercuric Chloride is also in Part I—a reasonable alteration.*)
Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**), but in treatment it may be increased to ¼ grain. Fr. Cx.: *Max. single dose* ½ grain. Max. during 24 hours 1 grain approximately. *Intravenously* $\frac{1}{32}$ grain increased, *v.*, p. 472.
In heavy colourless crystalline lumps or white powder.
Antidotes.—Emetics, Apomorphine, white of 1 egg for every 4 grains of perchloride, *vide* also Poisons and Antidotes at end of book. Mercurial poisoning from surgical use of Sublimate especially when left in wounds and cavities should be treated by diuretics. Stimulants for collapse and Potassium Chlorate for stomatitis.
Sodium Hydrosulphite (*q.v.*) has been advised on basis of animal experiments (dogs). 0·1 Gm. per kilo followed by 25 Cc. N. Hydrochloric Acid in ½ tumbler of water, and subsequently lavage.
Give a glass or two of milk and then several raw eggs, followed by emesis or lavage.—Jl. A.M.A. i./27,626.
Mercury line on *gums.* Distinguish from lead line, *cf.* Plumbum.
44 grains of Mercuric Chloride in the form of soluble tablets taken after a full meal—death followed seven days after. Treatment, lavage of the stomach, antidotes, stimulants and attempts to assist elimination.—L. ii./11,297.
Recovery after 8¾ grains taken by a man of 85. White of egg and water administered, stomach tube passed. Washed out stomach with large quantities of albumen water and milk and water. Strychnine hypodermically and milk

and brandy *per os*, hot blankets and bottles. All the while bowels very irritable. During convalescence Cremor Magnesiæ and brandy in milk. Ultimate recovery.—B.M.J. i./13,116. Chronic Mercurial poisoning from prolonged use of an ointment consisting of White Precipitate, Resorcin and Camphor.—Per Clin. Jl., Nov. 21, '23,562. *For further data of poisoning fatalities, see* 17*th Edn., p.* 462.

Soluble 1 in 18 Water at 60° F., 1 in 4 of Alcohol 90% at 60° F., 1 in 4·35 Ether (0·720) at 58·5° F., 2 in 3 of Glycerin.

Neutral double salts (more soluble) are formed with Mercuric Chloride in solution on addition of Sodium Chloride, Ammonium Chloride and other Metallic Chlorides.

These solutions contain fewer Mercuric ions and are hence *less poisonous* (taking same weights of Mercury) than solutions of Sublimate. We showed that they are not more antiseptic than Sublimate. *Cf.* data under **Uses**, also Chapter on ' Antiseptic Powers,' *Vol. II.* The late Lord Lister tried one of the Potash Compounds in his earlier work.

The *B.P.* '14 preparations are Ⓟ **Lotio Hydrargyri Flava** (0·46 to 100, or 2 grains to 1 ounce Solution of Lime), and Ⓟ **Liquor Hydrargyri Perchloridi**, 1 in 1,000 ($\frac{1}{18}$ grain in 1 drachm approx.),

Dose.—$\frac{1}{2}$ to 1 drachm. *Syn.* **Van Swieten's Solution**, Fr. Cx.

Incompatibles.—It precipitates most alkaloids from solutions, and should therefore not be ordered with them : the alkalis and the salts of silver and lead are attacked also. Steel surgical instruments should not be dipped in this solution. It forms insoluble compounds with albuminous fluids (*v. infra*), also incompatible with bodies containing tannin, soap, iodine and potassium iodide.

Incompatible with Borax—mixture of Borax and Mercuric Chloride solutions give precipitate of basic Mercuric Oxychloride. Avoid by adding Glycerin.—P.J. i./32,40.

Uses.—A powerful antiseptic. 1 in 1,000 solution kills anthrax spores in 15 minutes, the bacilli themselves being killed by 1 in 15,000 in 1 minute. The growth of the bacilli in question is prevented by 1 in 500,000 strength.—Hale White.

In blood broth mercury salts have less power than supposed.—L. P. Garrod, B.M.J. i./31,574.

1% soap increases its antiseptic power.—P.J. i./31,547.

Its solution does not pass through animal membrane rapidly. *For further data vide* Antiseptics, *Vol. II.*

Strengths of Perchloride Solutions for use :—

Aqueous solutions 1 in 10,000 to 1 in 1,000 may be used for infected linen, the walls and floors of infected rooms, the hands of surgeons and gynæcologists, and as a lotion to superficial wounds. For continuous applications 1 in 10,000 forms an active lotion, but 1 in 500 is the minimum strength (with acid added) for use to disinfect excreta, *cf.* Sublimate Disinfectant *postea.*

There is risk of poisonous effects from vaginal injections of 1 in 1,000 ; watch for the occurrence of diarrhœa.

Glycerin Solutions are also used as surgical dressings.

For References and further data re strengths for use, including Intravenous Use, v. p. 471 *et seq.*

Ⓟ **Glycerinum Hydrargyri Perchloridi,** R.O.H. specifies '4, 8 or 16 grains' to Glycerin 1 ounce. U.C.H., is 0·1%. L.H. the same strength, *viz.*, Mercuric Chloride 17½ grains, Distilled Water 6 drachms, Glycerin to 2 pints, tinted blue with *Liquor Cæruleus*, which contains Turquoise Blue 4 grains in Distilled Water 1 ounce. Distinguish from the following:
Ⓟ **Glycerinum Hydrargyri Perchloridi Alcoholicum,** U.C.H.—Mercuric Chloride 35, Glycerin 50, Methyl Blue 0·05, Methylated Spirit to 100. *For disinfecting Urine.* ***Caution.***—Not for administration.

Ⓟ **Lint, Absorbent Wool, Gauze,** or **Wood Wool,** *q.v.*, may be impregnated with ½% of each, Corrosive Sublimate and Glycerin.

Ⓟ **Mistura Hydrargyri Perchloridi, E.L.**—Solution of Mercuric Chloride 10 minims, Water to 1 drachm.

Ⓟ **Mistura Hydrargyri Perchloridi Composita.**
Dose.—½ ounce (**15 Cc.**) in a little water in syphilis thrice daily 30 minutes after food, for adult males.—(*Caution.*=¼ grain Sublimate per dose); females half the dose.
Mercuric Chloride 4 grains, Potassium Chlorate 1½ drachms, Ammonium Chloride 3½ drachms, Compound Tincture of Cardamoms 1 drachm, Simple Syrup 1 ounce, Water to 8 ounces. The Perchloride (= ¼ grain per dose) is tolerated by the addition of the other salts. In syphilis the dosage, as stated, has given valuable results.—J. Bain, B.M.J. ii./12,496.

Ⓟ **Gargarisma Hydrargyri Perchloridi,** (1 in 1,800). Mercuric Chloride ¼ grain, Hydrochloric Acid 1 minim, Glycerin 30 minims, Water to 1 ounce.
R.O.H. has Mercuric Chloride 2 grains, Glycerin 1 ounce, Water to 20 ounces.
For influenza, sore throat, especially quinsy, Solution of Mercuric Chloride 1, Acid Infusion of Rose Petals 1. One tablespoonful in a teacup of hot water as a gargle.

Ⓟ **Lotio Hydrargyri Acetica.**
Mercuric Chloride 1, Acetic Acid 75, Glycerin 75, Alcohol (90%) 250, Rose Water 500. To destroy pediculi and detach their ova.
Tinea has been destroyed by 3 grains dissolved in an ounce of Spirit of Nitrous Ether.

Ⓟ **Lotio Hydrargyri Perchloridi, U.C.H.** Mercuric Chloride 0·2% coloured with Turquoise blue. L. H. and C. H. W. are 1 in 1,000. R.O.H., 1/8, 1/10, 1/16 or 1/20 grain in 1 ounce. The three last not coloured.

Ⓟ **Lotio Hydrargyri cum Acido Carbolico, E.L.**
Solution of Mercuric Chloride 1, Dilute Acetic Acid 2, Turpentine Oil 6, Phenol Solution (1 in 40) to 24. For pediculi.

Ⓟ **Lotio Parasiticida, St. M.'s H.**
Mercuric Chloride ¼ grain, Acetic Acid 2 drachms, Water to 1 ounce.

Ⓟ **Lotio Hydrargyri cum Oleo Terebinthinæ, U.C.H.**
Mercuric Chloride 0·6, Methylated Spirit 12½, Turpentine to 100.

Ⓟ **Pigmentum contra Tineam.**
Mercuric Chloride 1, Salicylic Acid 9, Phenol 10, Glycerin 80. Efficient in ringworm.
ALOPECIA SYPHILITICA.—Mercuric Chloride 3 grains, Acetic Acid 5 mimims, Alcohol 90% 8 ounces. Apply with a tooth brush night and morning. Use also Pomade each evening.—Calomel 15 to 30 grains, Salicylic Acid 8 grains, Vaselin 1 ounce.—B.M.J. ii./10,180.

Collyrium Hydrargyri Perchoridi, N.H.I.

Mercuric Chloride Solution 1, Distilled Water to 3. Dilute with equal quantity of water: strength when diluted 1 in 6,000.

Ⓟ **Mackenzie's Eye Wash.**

Sublimate 1, Ammonium Chloride 6, Belladonna Extract 10, Coccus Cacti 1½, Proof Spirit 55; rub together and add Water to 330. Mix with equal parts of boiling water to bathe the eyes.—*Caution.—This is about five times as strong as usually employed.*

Ⓟ **Pills** contain $\frac{1}{40}$, $\frac{1}{32}$, $\frac{1}{20}$, $\frac{1}{16}$, and $\frac{1}{12}$ grain.

℞ℙ1 **Pilules de Chlorure Mercurique Opiacées. Dupuytren's Pills.**—Fr. Cx.

Mercuric Chloride 1, Opium Extract 2, Extract of Agropyrum 2 (Extrait chiendent), Licorice Powder *q.s.* For 100 pills. Each pill contains Mercuric Chloride 0·01 Gm. and Opium Extract 0·02 Gm.

Ⓟ **Liquor Hydrargyri Antisepticus W.H.** *Syn.* **Sublimate Disinfectant.**—*Local Government Board.*

Sublimate ½ ounce, Hydrochloric Acid 1 ounce, Soluble Aniline Blue 5 grains, Water 3 gallons.

Liquor Hydrargyri Perchloridi Acidus ('Typhoid Solution') St. Th. H.

Mercuric Chloride 1 ounce, Hydrochloric Acid (strong) 25 ounces, Water to 500 ounces.

Used only as disinfectant for excreta.

Ⓟ **Perchloride** ✱ **'Solubes'**, combined with Sodium Chloride and coloured blue, are made of three sizes:

(1) 17½ grains, making 20 ounces 1 in 500.
(2) 8·75 grains, making 20 ounces 1 in 1,000.
(3) ½ grain, makes 10 ounces 1 in 4,500 (for ophthalmic work).

The two stronger solutions may be diluted further with warm water. See **strengths of solutions** for use for various purposes *antea* p. 468.

Ⓟ **Perchloride Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint with water makes a pint of 1 in 1,000 solution.

Regarding the anomaly of a Solution or other dilution of Mercuric Chloride being a Ⓟ *poison, see p.*467.

(✱'Solubes' (T.M. 254730) signify material for making solutions for external or local use. A list is given in the Index.)

Ⓟ **Harrington's Solution.**

Mercuric Chloride 0·8 Gm., Water 300 Cc., Hydrochloric Acid 60 Cc., Alcohol 90% 640 Cc. A powerful antiseptic preparation for sterilising the skin before operation.

Ⓟ **Sublimate-Spirit *for Skin Sterilisation.***

Alcoholic Solution of Mercuric Chloride, 1 in 1,000 of 70% Alcohol, is more bactericidal than Tincture of Iodine, and suitable Aqueous Solutions of Sublimate.

A criticism of Mercuric Chloride, Iodine, Picric Acid and Mercurochrome as skin antiseptics.—J.A.M.A. ii./26,1347; P.J. ii./26,677.

Ⓟ **Tablets,** $\frac{1}{100}$, $\frac{1}{32}$, $\frac{1}{16}$ and $\frac{1}{10}$ grain are for internal administration

Ⓟ **Hypodermic Tablets,** $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.

Ⓟ **Wool, Perchloride ('Sublimate') 2%.**

To prepare, impregnate Absorbent Cotton 100 with 200 of a solution of 'Perchloride' 4 and Glycerin 2, press to 200 and dry it spread out. Weaker strengths can be prepared on the same lines with less Perchloride.

Ⓟ**P. Jap. IV.** uses Mercuric Chloride 2, Potassium Chloride 2, Water 1,500, Wool 1,000, *i.e.*, 0·2%. Faintly coloured with Scarlet or Fuchsin 'S.'

Sublimate-Malachite Green Solution.

A useful non-irritant solution.—*See* **Malachite Green.**

Ⓟ **Unguentum Desinficiens** (NEISSER-SIEBERT) **P. Svec. X.** Triturate Tragacanth 20 Gm. and Wheat Starch 40 Gm. with Glycerin 170 Gm. Dissolve separately Gelatin 7 Gm. in warm water 500 Cc. and add Mercuric Chloride 3 Gm. and Sodium Chloride 10 Gm. to this solution. While still warm add with stirring the Tragacanth, etc., mixture. Warm on water bath until homogeneous. When cool add Alcohol 90% 250 Gm. in small lots.—Swedish Medical Board, C.D., Aug. 5, '22, p. 204.

References and Strengths for Use.

CATARACT OPERATIONS.—576 cases, low percentage of eyes lost by suppuration was due to use of 1 in 2,000 Perchloride douche in conjunction with 4% Cocaine solution.—L. ii./09,1129.

CHOREA has been treated. Also in paresis, and varicose veins.

EMPYEMA has been treated by tappings and injections of ¼ grain Perchloride in 2½ ounces of water.

EMPYEMA, PNEUMOCOCCAL.—Irrigation of the pleural cavity with 1 in 40,000 Mercuric Chloride, in treatment. (1 in 20,000 kills the pneumococcus in 2 hours—Choyce's Surgery).—F. J. Hathaway, B.M.J. i./25,632.

EYE LOTIONS.—1 in 4,500 parts of water, and for lotions for the nose and mouth and for vaginal leucorrhœa the same strength is suitable. R.O.H. gives ⅛, 1/10, 1/16 or 1/20 grain per ounce of water for eye lotion.

Dangerous in treatment of ophthalmia neonatorum (especially in conjunction with Silver Nitrate drops)—4 recent cases quoted. Frequent washing out with Normal Saline or saturated Boric Acid solution safe and effective.—D. Forbes, L. ii./31,1102.

FISTULÆ.—Wool soaked in 1 in 2,000 Solution of Sublimate is the best dressing.—B.M.J. i./11,1048.

GLOSSITIS treated by a mouth-wash of Mercuric Chloride 2 grains, Hydrochloric Acid 8 minims, Glycerin ½ ounce, Water to 8 ounces.—B.M.J. i./11,536.

GONORRHŒA and GLEET.—A lotion 1 in 4,000 to 1 in 2,000 is recommended.

LUPUS, in initial stage, subcutaneous injection of 1% solution into affected tissue has been used.

MALIGNANT PUSTULE has been treated by use of sublimate as dusting powder without incision or excision. It has also been treated by hypodermic injection of 1 in 1,000 solution.

PRICKLY HEAT has been treated by rubbing in a lotion of 1 in 1,000 of water containing Hydrochloric Acid (strong) 2. Allow to dry on. If skin tender, wash off again after a few minutes. Usually cures in a couple of days. Repeat if necessary.

PUERPERAL INFECTION.—Irrigation with dilute Sublimate Lotion has been employed.

STOMATITIS.—If the surface epithelium is shed the mucous membrane may be brushed with 1 in 5,000 Sublimate solution.

SUPPURATIVE OTITIS MEDIA: Perchloride of Mercury in Glycerin 1 in 1,000 successful where all other treatments have failed. Carbolic Acid in Glycerin equally good.—T. P. Lowe, L. ii./28,256. Aqueous 1 in 10,000 solutions also used.

SYPHILIS.—Given in small doses, *e.g.*, 1/16 grain *t.d.*, has an antiseptic intestinal action and is employed in some forms of diarrhœa of infancy.

SYPHILITIC TREATMENT DURING MARRIAGE. The results of Mercury before 1905 (Wassermann Test), especially during pregnancy in the form of Sublimate, 1/16th grain thrice daily, were sufficient almost always to ensure a healthy child.—Amand Routh, B.M.J. i./23,632.

Intravenous Injection of Perchloride.

BILHARZIASIS (endemic hæmaturia).—Associated with this disease is almost invariably the appearance of blood and pus in the urine. Mercuric Chloride intravenously has been given with good results.

(Emetine Periodide and Auremetine, *q.v.* for further notes on treatment, have been successful.)

Diuretic action of Mercuric Chloride dissolved in serum injected intravenously is marked.—K. I. Melville and R. L. Stehle, Jl. Pharm. and Exp. Therap., Oct., '28,222.

Typhoid treated. Dose employed was 0·01 Gm., but 0·02 Gm. (Caution !) has been used in syphilis.—B.M.J.E. i./09,28.

ACUTE BACTERIAL INFECTIONS, *e.g.*, pneumonia, well treated by intravenous injections of $\frac{1}{32}$ or $\frac{1}{16}$ grain.—J. Burnford, L. i./26,312.

Syphilis, septicæmic conditions, influenzal pneumonia, treated intravenously with $\frac{1}{8}$ grain doses, increased every other day. Nephritis a contraindication and saline cathartics must not be used.—H. Schussler, Jl. Intrav. Therap., Jan., '25,11.

Bacterial infection, 330 cases treated with Mercuric Chloride or Mercurochrome, or both. 5 Cc. of a 1 in 1,250 solution of Mercuric Chloride ($\frac{1}{16}$ grain) in saline as a first dose, repeated if necessary in 12 to 24 hours, according to patient's condition. Maximum dose 7 Cc. Solution freshly prepared and injected directly into a vein. Among the complications cited are thrombosis, diarrhœa, stomatitis and nephritis.—L. S. Dudgeon, L. i./26,169.

PNEUMONIA, lobar and lobular, acute staphylococcic infections, chorea and subacute rheumatism, chronic infective arthritis of undetermined origin and encephalitis lethargica. Mercuric Chloride intravenously in doses of $\frac{1}{64}$ grain to $\frac{1}{16}$ grain is very useful, *e.g.*, $\frac{1}{16}$ grain in Normal Saline 8 Cc. Intestinal irritation may occur.—H. Pritchard, B.M.J. i./27,794.

Injectio Hydrargyri Perchloridi (Intravenous) Gt. Orm. H. contains 1/40 grain (0·0015 Gm.) in Normal Saline 85 minims (5 Cc.) for children under 2 years. For older children 1/30 grain (0·002 Gm.) in the same volume. May be repeated on three successive days.

Primary syphilis has been treated by Iontophoresis of a 2% solution. *Vide* **Iontophoresis.** Vol. II.

℗Sal Alembroth.—*Syn.* **Ammonio-Mercuric Chloride.**

$HgCl_2.2NH_4Cl,H_2O = 396{\cdot}532$.

A powerful antiseptic, but does not combine with albumin quickly and hence is not very irritating. ***Uses***—In medicating dressings ℗BANDAGES, ℗GAUZE, ℗WOOL GAUZE, and ℗WOOL TISSUE, 1 or 2% (which are dyed blue), also as an intramuscular injection for syphilis. (*Dose*, 10 minims of 5% solution. Painful. Slowly eliminated.)

Soluble 2 in 1 of Water, 1 in 4 of Alcohol 90%, also in Glycerin.

Hydrargyri Salicylas.

Dose.—$\frac{1}{3}$ grain (**0·02 Gm.**) (internally). This in our opinion may be regarded as a maximum single dose. Intramuscularly $\frac{1}{10}$ grain in 10 minims Liquid Paraffin, increased up to 1 grain. (Cocaine Salicylate may well be added.)

Manufacture.

When produced by the interaction of Mercury Oxide and Salicylic Acid, the chief constituent is Anhydro-hydroxy-Mercuric-Salicylic Acid of formula

$$C_6H_3\begin{cases}OH\\CO\\Hg\end{cases}O = 336{\cdot}6412.$$

P.G. VI gives the maximum single dose of this compound as 2½ grains (0·15 Gm.), while P.G. V. gave $\frac{1}{3}$ grain (0·02 Gm.). It is also official in P. Ital. V.

A white powder containing about 59% of mercury, very slightly ***soluble*** in water (but soluble in solutions of sodium hydrate and

sodium carbonate), scarcely soluble in alcohol 90%. ***Used*** as an antiseptic and antisyphilitic and as a dusting powder or ointment for sores. Should not be given in large doses with potassium iodide.

This is the basic mercuric salicylate as distinguished from the neutral or normal salt (*vide* below). Hydrogen sulphide distinguishes easily, the normal salt is precipitated at once, this one slowly. Two mercurous salts are known.

As an injection for gonorrhœa 15 minims of a mucilage suspension 1—300 has been used.

Three to four injections intramuscularly in 10—14 days of 10 minims of 1% suspension of Mercury Salicylate in Liquid Paraffin gave excellent results in Bell's palsy.—P. A. Harry, Pres., Aug., '26,290.

Local skin affections well treated with Mercury Salicylate in Liquid Paraffin injections intramuscularly, 1 grain per Cc. dose.—W. A. Elliott, B.M.J. i./25,551.

The injection of Mercury Salicylate intramuscularly artificially induces leucocytosis. This accounts for its beneficial action in certain cases of syphilis, in furunculosis, and small infected wounds, and in trachoma. One to three injections often give good results in asthma, hay fever, arthritis, bronchiectasis, and skin complaints. Encephalitis lethargica well treated by 4 injections, each of 1 grain of Mercury Salicylate in oily suspension.—Burr Ferguson, L. i./25,1292.

In rabbits, Mercury Salicylate appears to be more rapidly absorbed when in oily suspension, in which instance its lethal dose is 0·03 Gm. per kilo.—Jl. Ph. and Exp. Ther., June, '26,388.

Sterules of Mercury Salicylate, $\frac{1}{10}$ to 1 grain in 1 Cc. of Liquid Paraffin, are made.

Hydrargyri Salicylas, Neutrale. $(C_6H_4.OH.COO)_2Hg=474·688$.

Dose.—Hypodermically $\frac{3}{10}$ to 1 grain suspended 1 in 10 in Liquid Paraffin. Comparatively non-irritant.

Quinine Urea (2%) added relieves pain as follows:—

Quinine Urea 2, Water 2, solve and mix with Anhydrous Wool Fat 20. To this add Mercuric Salicylate 10, Liq. Paraffin *q.s.* to 100.

Prophylaxis of Syphilis. The following jelly in collapsible tubes, Neutral Mercury Salicylate 10, Irish Moss 5, Water 85, may be prepared for smearing over the parts.

Mercurosal. *Syn.* Di-Sodium-Hydroxy-Mercuri-Salicyl-Acetate.—$C_6H_3COONa.OCH_2COONa.HgOH.=456·6508$.

Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**) intramuscularly. $1\frac{1}{2}$ grains (**0·1 Gm.**) intravenously in 5 Cc. of water. A white powder freely soluble in water. Used in syphilis intravenously it does not irritate veins. It is less toxic than Mercuric Chloride.

Merthiolate. *Syn.* Sodium Ethylmercuri-Thiosalicylate, $C_2H_5.Hg.S.C_6H_4.COONa$.

An American preparation containing 49% Mercury in organic combination. A potent germicide for sterilising tissue surfaces. Less toxic than Mercuric Chloride. For general application 1 in 1,000 isotonic solution: for mucous membranes 1 in 2,000 to 1 in 5,000.—N.N.R., Jl. A.M.A. ii./29,1809.

Hydrargyri Subchloridum, Mercurous Chloride. *Syn.* Calomel, **Mercurius Dulcis, Ph. Ned. V. Hydrargyri Chloridum Mite. U.S.** *Syn.* Précipité Blanc Fr. Cx., F.E. VIII. (distinguish from British and P. Belg. IV. White Precipitate which is Hydrargyrum Ammoniatum). HgCl=236·103.

Dose.—$\frac{1}{2}$ to 5 grains (**0·03 to 0·3 Gm.**). U.S., *average laxative* $2\frac{1}{2}$ grains. Fr. Cx. has maximum single dose 15 grains, maximum during 24 hours, 15 grains.

Heavy white powder. We have also prepared it as *small, soft, scaly crystals* for eye work. The **Finely Divided Calomel of Duret** (Vol. II.) is similar to this.

Insoluble in water, ether or alcohol.

Incompatible with acids, alkalis (*see* Lotio Nigra), with sodium and potassium chloride and with bromides, iodides, sulphur, cherry laurel water, and antipyrin.

With regard to Calomel and Sodium Chloride, the usual view is that Mercuric Chloride may be formed.

Pharmacology.—Taken internally, it is converted into Mercury Sulphocyanide with traces of Mercury-Albumin compounds. Since the solubility of Mercury Sulphocyanide is markedly increased by alkali chlorides, salt should be withheld from patients taking Calomel.—P.J. ii./10,438.

Uses.—Alterative and purgative. Was always considered a cholagogue, but at the present time is thought to empty the gall bladder only, not to increase the actual amount of bile formed. Most useful purgative for congested liver and dyspepsia generally. To be given at bed-time followed by morning saline draught. Useful where there is intestinal putrefaction, *e.g.*, in dysentery, fæcal accumulation, typhoid. For torpid liver $\frac{1}{4}$ grain doses hourly valuable. As dusting powder to ulcers and many skin diseases (but not to the cornea of the eye if Potassium Iodide is being given). Applied dry relieves pruritus ani.

Amœbic Dysentery treated by Calomel and Magnesium Sulphate, followed by Salol, Bismuth Salicylate and Dover's Powder, 5 grains of each in cachets.—N. Cantlie, Jl. Trop. Med., Feb. 1, '23,43.

Asiatic Cholera might well be treated with 5 grain hourly doses of Calomel—increasing to 10 grains if necessary.—W. E. Fellowes, B.M.J. ii./21,176.

Asthma is relieved by $\frac{1}{2}$ to 2 grain doses.

Diarrhœa.—Large doses of Calomel. 20 grain doses repeated twice in the first 12 hours in the acute enteritis met with in the Tropics with temperatures ranging between 103° and 106° most successful. In dysenteric diarrhœa 12 grains repeated twice in the 12 hours is perfectly safe, but whether constipation be present or absent 1 grain every three hours in 12 doses results in pronounced salivation in adults—the same would occur with this dosage in children, though they are known to be much more tolerant of Calomel.—H. D. McCulloch, B.M.J. ii./12,1428.

Infants with diarrhœa may receive 2 grains. If vomiting, add equal quantity of Cerium Oxalate.—W. E. Fellowes, B.M.J. ii./21,176.

Enuresis.—Give $\frac{1}{4}$ grain daily to regulate bowels.

Gall Stones are often expelled after large doses of Calomel followed by Castor Oil.—Whitla, Pract. Med.

Neurasthenia and Neuralgia.—Intestinal antisepsis is required, Calomel may be useful.

Optic Neuritis. Weekly injections of $\frac{1}{4}$ gr. have been successful.

Peenash. Due to the ravages of the larvæ of *Lucilia Macellaria*. One drachm of powdered Calomel blown into the nose or affected cavity kills the larvæ and causes them to drop out; washing out afterwards with a lotion will bring out the deeper seated ones. Infections with *Dermatobia noxialis* also treated in the same way.—B.M.J. i./11,362.

Quinsy.—Calomel placed on the tongue in $\frac{1}{6}$ grain doses and repeated every half hour for 12 to 18 hours stated to abort a quinsy. If used before suppuration occurs it may abort in 18 hours without purging. In two cases where suppuration had begun within the tonsil the method failed and strongly purged the patient.—B.M.J. ii./12,1249.

In Raised Arterial Tension where indicative of danger, $\frac{1}{2}$ to 1 grain pill once or twice weekly followed by saline in the morning keeps down pressure.—Brunton.

Suspicious cracks or hangnails should have this ointment well rubbed in :—Calomel 33, Vaseline 10, Anhydrous Lanolin 57.—*Cf.*

Unguentum Prophylaxis.

Calomel Ointment 30% used as a prophylactic for syphilis in rabbits, provep efficacious up to 8 hours after inoculation with the disease. Death from mercurial poisoning produced by single application of a large amount of the ointment.—H. Nichols and J. Walker, per Jl. Trop. Med., June 15, '23,223.

Calomel Tablets, $\frac{1}{10}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 3, 4, and 5 grains.

Injectio Hydrargyri Subchloridi Hypodermica. Lambkin's Original Formula.

In syphilis, Calomel 10 grains, suspended in Sterile Olive Oil containing 2% Carbolic Acid, $\frac{1}{2}$ ounce. *Dose.*—10 minims injected once a week. Calomel is quickly absorbed but intensely painful, best used only as heroic measure.

Morphine $\frac{1}{4}$ grain should be given afterwards to relieve pain.

Calomel Cream. *P. Off.*—Contains 5%. Heat Wool Fat 50 and Olive Oil 23 separately at 150° C. for 1 hour and cool. Triturate Calomel in fine powder 5, in a sterile mortar with a little of the Oil. Add the Wool Fat and rest of the Oil and incorporate Camphor 10 dissolved in Creosote 10 and mix. We find the formula satisfactory.

Calomel injected with Oil in this way is partly converted into a soluble compound (probably Mercuric) and absorbed by the lymphatics and blood vessels and is partly taken up by Leucocytes and converted into a soluble compound within these.—Marshall.

Poisoning, fatal, from intramuscular Calomel injections.—B.M.J.E. i./22,49.

Ⓟ **Lotio Hydrargyri Nigra** (*B.P.* '14). Black Wash.

Mercurous Chloride, Glycerin, and Solution of Lime, about 1 in 150. Tragacanth Mucilage is now omitted. Contains Ⓟ **Mercurous Oxide** Hg_2O=417·2. (Ⓟ Precipitate, Red and all Oxides of Mercury').

Ⓟ **Unguentum Cinereum** containing Mercurous Oxide 1 in 10 or 20 of lard has been prescribed for syphilis—distinguish from Oleum Cinereum *q.v.*

Ⓟ **Gargarisma Hydrargyri Composita.**

Black Wash 1 ounce, Potassium Chlorate 10 grains, Water 1 ounce. For syphilitic throats.

Pilula Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.

Calomel $\frac{1}{2}$ grain, Rhubarb Extract 2 grains, Cascara Extract 1 grain, Capsicin $\frac{1}{8}$ grain.

Relieves constipation, *e.g.*, that arising from large doses of Bismuth in treatment, see also Mistura Bismuthi, Phenolis et Morphinæ.

Pulvis Basilicus.

Dose.—For a child of 2 years, 4 grains (**0·25 Gm.**); of 6 years or upwards, 8 grains (**0·5 Gm.**).

Mercurous Chloride 3, Scammony 3, Acid Potassium Tartrate 3, Jalap 1, Ginger 1, Antimonial Powder 1.

Suppositoria Hydrargyri Subchloridi, L.H. Contain $\frac{1}{2}$ or 1 grain.

Unguentum Hydrargyri Subchloridi.—*Syn.* Calomel Ointment (*B.P.* '14) Mercurous Chloride 1, Benzoated Lard 4. To relieve irritation.—See also **Unguentum Prophylaxis.**

Calomel Cream, L.L. Calomel 10 grains to Soft Paraffin 1 ounce, Distinguished from that of Lambkin—*q.v. supra.*

Hydrargyri Succinimidum, Imido-succinate of Mercury.
$[C_2H_4(CO)_2N]_2$. Hg=396·6884.

Dose.—By injection, $\frac{1}{4}$ to $\frac{1}{3}$ grain (**0·016 to 0·02 Gm.**).

Mercury Succinimide is a white powder, ***soluble*** in water about 1 in 28. Hypodermically in syphilis has been used in 2½% solution Addition of cocaine nitrate diminishes pain.

℞ ℙ **Sterules, Hypodermic** of Mercury Succinimide, contain $\frac{1}{3}$ grain with Cocaine Nitrate $\frac{1}{6}$ grain.

Hydrargyri Sulphas. Mercuric Sulphate. *Syn.* **Hydrargyri Persulphas.** $HgSO_4$=296·67.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white powder made by dissolving Mercury in boiling strong Sulphuric Acid. Water decomposes it with formation of yellow **Turpeth Mineral, Hydrargyri Subsulphas** Fr. Cx. or **Mercuric Oxysulphate,** $HgSO_4 2HgO$=729·89.

It is a prompt emetic in dose of 2 to 5 grains which was given to children in croup and diphtheria to expel false membrane. Does not produce purging. **Turpeth Mineral Ointment, Bazin's Ointment,** is 1 in 30 of Benzoated Lard. Used for ringworm.

Mercurous Sulphate, Hg_2SO_4=497·28.

A whitish crystalline powder slightly soluble in water and in dilute nitric acid. This salt, as also Mercuric Sulphate mixed with Potassium Bisulphate, is used for construction of electrical cells.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi.** *B.P.* '14.

Ⓟ **Yellow Mercuric Oxide** HgO = 216·61. (Made by precipitating Mercuric Chloride with Sodium Hydroxide Solution) in very fine powder 1, Soft Paraffin, yellow, 49. The powder and the resulting ointment should be neutral to moistened litmus paper.

Incompatibility.—Should not be used whilst patient is taking Iodide—violent irritation may be produced.

Used for inflamed eyelids (but caution *antea*). Ⓟ **Pagenstecher's Ointment** 4%, *i.e.*, double this strength; ointments of 1, 2·5, 5, and 10% are also prepared. Syphilitic sores and eczema are well treated by the 1% ointment.

Martindale's Method of Manufacture.

We recommend the Yellow Mercuric Oxide *to be freshly precipitated and converted into ointment without preliminary drying.* This produces a perfectly smooth ointment free from grit. It can be effected by taking the equivalent of Mercuric Chloride to start with. 1·25 kilo of Corrosive Sublimate will produce 1 kilo of Yellow Mercuric Oxide on precipitation with Sodium Hydroxide (Solutions must be very dilute). This is carefully washed until the washings do not react with either Silver Nitrate or Phenolphthalein, and pressed in suitable linen free from "fluff," and finally in this moist condition is made up to 10 kilos with Paraffinum Molle (Yellow should be quite as suitable as white). The amount of moisture in the precipitate is easily ascertained and allowance made for, and *is reducible, by pressing to a very small amount.* Weaker strengths can then be prepared from this 10% bulk, as desired, by dilution with Paraffinum Molle. If kept exposed to light, Yellow Ointment may turn dark on the surface. If desired, the ointment may be kept under water, or be placed in 'Collapsubes' (strengths as above mentioned). We examined the contents of such Collapsubes two years after preparation and found them in good condition.—W. H. Martindale, Oph., Nov., 1906; L. ii./06,1459.

R.O.H. also adopts this method. 2, 4 and 8 grains to 1 ounce (0·5, 1 and 2% approx.).

Ⓟ **Pasta Flava, Gt. Orm. H.**
Yellow Mercuric Oxide 15, Zinc Paste to 440 (Zinc Paste in this instance is Starch 108, Zinc Oxide 108, Soft Paraffin to 440).

Ⓟ **Unguentum Hydrargyri Oxidi Rubri.**
Syn. RED PRECIPITATE OINTMENT. (*B.P.* '14.)
Red Mercuric Oxide 1, Paraffin Ointment 9. For use in chronic skin affections.
The Red Oxide is crystalline, and the Yellow (by precipitation) amorphous, but they are chemically identical.

Ⓟ **U.S. VIII.** had Red Oxide 1, Water 1, Hydrous Wool Fat 4, Petrolatum 4.
Lanolin used for this ointment, if applied over large surfaces may lead to severe Mercurial poisoning and is, therefore, ***to be avoided.***
20 grains of Red Precipitate taken *per os* proved fatal.—W.H.M., 1923.

Ⓟ **Pommade de Lyon.** Red Mercuric Oxide 1, Vaseline 15.

Ⓟ **Unguentum Rubrum cum Cantharide. V.H.C.** 1904. Red Mercuric Oxide 1, Vinegar of Cantharides 1, Soft Paraffin 6.

Hydrargyri Sulphidum Rubrum. *Syn.* VERMILION, CINNABAR.
HgS = 232·656. Brilliant red powder insoluble in water and dilute acids prepared by subliming a mixture of Mercury and Sulphur. Both this and the black variety, **Hydrargyri Sulphuretum cum Sulphure** of same composition are not now employed therapeutically to any extent.

Black Mercuric Sulphide, AETHIOPS MINERALIS was in P.G. I.

Aethiops Antimonialis.—A mixture of equal parts Black Mercuric Sulphide and Grey Antimony Sulphide.

Ⓟ **Unguentum Rubrum** (Blackfriars).—N. H. W.
Vermilion 6 grains, Red Mercuric Oxide 6 grains, Creosote 2 minims, Lard to 1 ounce.

Ⓟ **Hydrargyri Sulphocyanidum.** *Syn.* MERCURIC RHODANIDE $Hg.(CNS)_2$=316·746.
White powder slightly soluble in water. Swells up on burning, producing 'PHARAOH'S SERPENTS.'

Hexamine Compounds of Mercurial Salts, Acetate, Cyanide and Sulphate have been made. The inclusion of Hexamine reduces corrosive effect.—C.D., Mar. 31, '23, p. 436.

Ⓟ **Flumerin.** *Syn.* DISODIUM SALT OF HYDROXYMERCURIC FLUORESCEIN. $C_{20}H_9O_5.Na_2,HgOH$=592 682.
Ⓟ *Cf. remarks under Mercurome.*
A mercurial advocated for the intravenous treatment of syphilis but it has been little used—Details in XIXth Edn. p. 478.

Ⓟ ***Mercurome** (T.M. 454754). DI - SODIUM - DIBROMO - OXY-MERCURY - FLUORESCEIN, $C_{20}H_7O_5Br_2.HgOH.Na_2$=750·4984.

Patent and Trade Marks.
* "**Mercurome**" is a Trade Mark of the author of the *Extra Pharmacopœia* in Great Britain and India.
This chemical is known in the United States and some other countries as "Mercurochrome—220 soluble." It is patented in U.S.A. and in some other countries, but not in England, and "Mercurochrome" is a trade mark in U.S.A. and some other countries, but not in England. The introduction *of Mercury in Phthaleins was the subject of patents in* 1914-15; *investigations by E. C. White resulted in the synthesis of Mercurochrome in* 1920 *and his patent in* 1925. *In England it was first made by the author of the 'E.P.' in* 1923.

Ⓟ*Legally it is not a poison at all, but a substance like this should have been scheduled long ago.*

Dose, per os.—Our *personal* experience is limited to 1/12 grain (**0·005 Gm.**) in Stearettes, but we are aware that larger amounts have been given.

Kenneth Walker states he has given 0·9 Gm. (in 3 doses of 0·3 Gm. each) *per diem*, by means of capsules containing 0·1 Gm., though usually 0·6 Gm. has not been exceeded, and with this latter amount no toxic effects have been noticed.—B.M.J. i./30,841.

Intravenous Use.—Pneumonia and other acute bacterial infections have been treated. Some hold it should be reserved for desperate cases.

Dose.—0·002 to 0·005 Gm. per kilo, *i.e.*, 0·13 to 0·32 Gm. per 10 stone (63½ kilo) man, preferably in 0·5% or *greater* dilution.

Numerous notes are given in the following pages regarding a 1% solution, but the desirability of this is questioned.

L. S. Dudgeon (L. i./26,172) regards "10 *Cc. of a* 0·5% *Solution* =0·05 Gm.) as the *maximum* that should be used, and after 2 to 3 doses of this strength it is necessary to reduce to 1 in 500."

Note.—3 mgr. per kilo=3 grains for a 10-stone man.
5 ,, ,, ,, =5 ,, ,, ,, ,, ,,

With the full dosage of 5 mgr. per kilo great care is needed and injections should only be given at intervals of 3 days or more. Personally, we do not advise the use of so high a dosage, except in extremely desperate cases, in view of the invariably severe reaction which results.

Pharmacology.—The writer had experiments specially conducted on animals, Dec., 1927, and correspondence in L. ii./27,1267 and B.M.J. i./30,761, from which the above doses are deduced.

Solutions should not be boiled or autoclaved.

Activity is said to be enhanced by the ***addition of Glucose*** to the solution for injection at the time of use. The *Intravenous Dose* with this solvent has been 10 to 20 Cc. of a 0·4% solution (0·1 Gm. in 25 Cc.).

It is stated that the procedure tends to create a ***cumulative effect.*** —H. W. S. Wright, Pr., June, '29,376.

Toxicity reduced by combining with Glucose *immediately* before injection (mixtures of Mercurochrome and Glucose give precipitation of Metallic Mercury within 24 hours).—D. I. Macht and W. C. Harden, Jl. Pharm. and Exp. Therap., Mar., '28,339.

Mercurochrome is extremely toxic to the nervous system. *Intraspinal injections cause death rapidly.*—Per Pres., Jan., '28,7.

Chemical Characters.—Iridescent green scales. It contains approx. 25% of non-ionised Mercury.

Soluble readily in water. In absolute alcohol, 1 in 185, in Alcohol 90%, 1 in 65. Insoluble in Acetone, but soluble in a mixture of Acetone and diluted alcohol—See **Solution for local Surgical use** *postea*. *Insoluble* in Chloroform and ether.

Stabilising of Solutions. It is stated that 0·18% Ammonia stabilises Mercurochrome solutions. Our experiments (1931) do not support this contention.

Biological assay.—A method has been evolved by J. H. Burn and G. K. Elphick by which the average lethal dose of the

chemical, *i.e.*, the amount per kilo which will kill 50% of a number of mice, injected intravenously with minute doses, is arrived at. They suggest as a standard that the amount in question, to permit of a sample being passed for medicinal use, shall be not less than 105 mgr. per kilo.—B.M.J. ii./30,865.

The matter is of course important in respect of intravenous medication, though the arithmetical deduction involved is open to logical criticism.

The author has on numerous occasions submitted samples made in his Laboratories to the Pharmacological Laboratory of the Pharmaceutical Society of Gt. Britain, for examination on the lines indicated, and on the evidence of the Reports received the relative ' batches ' of the chemical have been issued.

The writer takes exception to the figure of 105 mgr. being regarded as a hard and fast ' standard,' and has had the opportunity of conferring with another manufacturer, who also holds divergent views from those of the pharmacologists mentioned.

One feels most strongly that if the chemical passes the most stringent quantitative tests for the components of the molecule, and is free from ionised Mercury, a margin of error should be conceded by the pharmacological experts in respect of variations in mice.

To put the matter concretely, the writer has issued for medicinal use supplies which, though correct chemically, have been reported on pharmacologically as having toxicity figures varying between 115 and 92 mgr. per kilo.

Burn and Elphick (Qtrly. Jl. Ph., 1930,3,177) themselves found that the toxicity does not vary in any way with the actual amount of Mercury, except where the Mercury was so much above theory as to render the product impossible of being called Mercurochrome.

We notice, further, that other workers have questioned the method:

Toxicity should be not less than 23 mgr. per kilo mouse. Only one sample out of 9 tested would have satisfied the standard of Burn and Elphick.—H. A. Mitchell, Qtrly. Jl. Ph., 1931, 4,329.

The toxic dose of Mercurochrome is much lower than has been previously stated, the average lethal dose for rabbits being about 30 mgr. per kilo.—D. I. Macht and W. C. Harden, Jl. Pharm. and Exp. Therap., Mar., '28,339.

Toxicities for mice may vary in different laboratories of the same town. Possibly slight difference in feeding materials account for it.—J. H. Burn and G. D. Greville, Jl. Pharm. & Exp. Ther., Dec.,'31.

A pharmacologist with whom we were discussing a dose of another, entirely different, chemical remarked " I do not place much reliance on the intravenous method of comparing M.L.D.'s. It is difficult to give the injections at constant and equal speeds."

Since the above was written a *standard* is adopted for comparison.

In the opinion of the writer, the essence of the whole matter is to ensure that the substance is *chemically correct* in respect of Mercury, Bromine, Sodium, etc., and that, in particular, it contains no, or practically no, ionised Mercury, or excess of Sodium.

Theoretically it should contain 26·7% Mercury, 21·3% Bromine, and 6·13% Sodium. It should yield no Acetate reaction.

Notes on Chemical Assay of Mercurochrome " 220."—G. W. Marris, P.J. ii./30,99.

Incompatible with acids and with alkaloidal salts, *e.g.* Atropine Sulphate, Cocaine Hydrochloride, Novocain, Alypin, etc.—not to be used with the latter as a vesical wash.

Uses.—Mercurome has been found of value as a vesical injection in cystitis, pyelitis, and in gonorrhœa. It has been used intravenously in pneumonia, pernicious anæmia, articular rheumatism, and in septicæmic conditions and numerous tropical diseases.

As a general antiseptic in surgery, it has been extensively employed in place of Tincture of Iodine, as although it possesses the advantageous properties of Iodine it does not burn, irritate, or injure tissue as Iodine may.

Mercurome solution for local Surgical use. Mercurome 2 is dissolved in Distilled Water 35, and Alcohol 95% 55 and Acetone 10 are added.

Penetration. The compound penetrates beneath the superficial surfaces in wounds and mucous membranes, and thus increases the field of germicidal activity and sterilises tissues beneath the surface. It also fixes the germicidal agent, prevents it being washed away and prolongs the aseptic period.

Stains on the skin are easily removed with a little Chloride of Lime.

Ⓟ**Mercurome First-Aid Sterules.**—Encased in rayon and cotton. Contain 30 minims of Alcohol-Acetone Solution.

Ⓟ**Mercurome Solution (Aqueous)** 1% is also prepared.

Ⓟ**Mercurome Sterules 0·2 Gm.** for dissolving in **40 Cc.** of water for *intravenous* injection (making 0·5% Mercurome Solution).

Ⓟ**Mercurome Sterules 0·3 Gm.,** for dissolving to make **30 Cc.** of 1% solution for *vesical* injection.

Ⓟ**Mercurome Solubes, 4·4 grains (0·29 Gm.).** One dissolved in an ounce of Distilled Water produces 1% (approx.) solution.

Ⓟ**Injectio Mercurochrome (Intravenous)** Gt. Orm. H. For *children* under 2 years 85 minims (5 Cc.) of ¼% solution = 0·012 Gm. For older children the same amount of a ½% solution = 0·024 Gm. May be repeated on three successive days.

Ⓟ**Mercurome Gauze** (1 in 1000) is prepared.

Ⓟ**Mercurome Ointment,** 5% in Lanolin basis has been used in gonorrhœa. We have little information on its clinical user.

Ⓟ**Mercurome Bougies,** 1% in Theobroma Oil basis, 4 inches long.

Ⓟ**Mercurome Suppositories,** 1% in Theobroma Oil basis 15 grains.

REFERENCES.

ANÆMIA, PERNICIOUS.—Intravenously on empty stomach in dose of 3 to 5 mgr. per kilo. Severe reaction, temperature rising to 103 or 104° F. Injection repeated after 3 days in dose ¾ as large, and again repeated in a further 3 days. Blood counts rose nearly to normal.—Jl. A.M.A. ii./25,302.

ANTISEPSIS ***(Local use mainly).***—2·5% solution for surface lesions, for balanoposthitis, or for painting vaginal walls, from which absorption is slight.—H. D. L. Spence, L. i./25,1382.

As a biliary antiseptic, it has promise, as it is excreted largely in the bile, and bile collected after intravenous injection is bactericidal.—Rosenthal and White, Jl. Ph. and Exp. Therap., '24,287.

2% Aqueous-Alcohol-Acetone solution effective to disinfect unbroken skin and for wounds, and mucous membranes, and good for pre-operation purposes.—G. F. Reddish and W. E. Drake, Jl. A.M.A. ii./28,716.

Infant suffering from staphylococcic suppuration of umbilicus cured by local injections. Pres., June, '25,231.

A powerful antiseptic of low toxicity, rapid and deep penetrability, and little irritation. Antiseptic properties augmented by acidity, diminished by increased density of solvent, and may be less apparent in heavy infections.—A. T. Todd, L. ii./25,1017.

For preparing the skin prior to operation using Acetone and Industrial Spirit.—R. B. Blair, B.M.J. ii./30,194.

As antiseptic in place of Iodine for varicose ulcers, septic conditions, dermatitis, pruritus, conjunctivitis, blepharitis, most useful.—C. L. Foille, B.M.J. ii./30,1072.

Mercurochrome in some cases of infection (*e.g.*, a pricked finger with sepsis following) good.—H. Dodd, B.M.J. ii./30,736.

Appendicitis, Suppurative.—Treated by injecting 10% Mercurochrome into the bowel. Good results.—W. Doolin, B.M.J. ii./30,737.

B. Abortus (*Brucella Melitensis*) infection may occur in man. Report of a case (the eighth in this country). Mercurochrome intravenously, 10 to 20 Cc. of 1% solution, repeated if necessary after several days, was curative.—I. J. Davies and W. C. Anderson, B.M.J. ii./29,14.

Arthritis.—Both gonorrhœal and non-gonorrhœal forms well treated.—Jl. A.M.A. ii./26,1369.

Creeping Eruption.—Opening and cauterising of the lines with 0·5% solution rapidly effective.—G. Giglioli, Jl. Roy. Soc. Trop. Med., Mar. 9, '29,414.

Cystitis and Pyelitis.—As a vesical antiseptic 1% is tolerated by the bladder for 1 to 3 hours and causes no pain. Rapid in infection in refractory cases, also for gonorrhœa and chancroids, as a dressing for buboes.—Jl. A.M.A., 1919,1483; B.M.J.E. i./20,20. See also Pres., June, '23,249.

Remarkable results in chronic cystitis. 75% of cures in 40 cases, only 3 not improved. Average number of days under treatment 18·5, and average number of treatments 7·6. In pyelitis 10 out of 17 cases cured.—Jl. A.M.A. ii./21,93.

Intractable cystitis with frequent micturition and pyuria well treated, especially amongst women.—K. W. Heritage, B.M.J. ii./30,866.

In old prostatic cases invaluable. After draining the bladder 30 Cc. of 10% solution injected—there is no need to irrigate.—C. H. Badcock.

Chronic Cervicitis.—Responded well when treated with a douche or paint.—L. C. Rivett, B.M.J. ii./30,866.

Discussion on value at meeting of Roy. Soc. Med. Apart from local application in chronic cervicitis, intravenously in appendix abscess, and irrigation in cystitis, the feeling of the meeting was apathetic rather than laudatory.—L. ii./30,1088.

Cholecystitis.—Clinically cured with intravenous injections. As the chemical is stored in the gall-bladder it is possible to obtain its shadow in roentgenograms.—L. Martin and J. H. Hill, Jl. A.M.A. i./29,2135.

Mercurochrome intravenously cured 5 out of 8 cases.—B.M.J.E. ii./29,17.

Diphtheria Carriers.—5% solution as paint effective.—P. Bousfield, L. i./28,79.

Dysentery.—Results of 5% solution, well diluted, by mouth and colonic irrigation, in amœbic dysentery (dose not stated).—Med. Jl. and Rec., Oct. 21, '25,479.

Amœbic Dysentery.—Colonic lavage with 1 in 1,000 solution at 110° F. given slowly and retained, a good adjunct to other remedies.—F. Smithies, Jl. A.M.A. ii./28,153.

Eczema.—Intravenous use has been successful.

Encephalitis.—Recovery following treatment in a case of acute hæmorrhagic encephalitis of the cortex.—Per Jl. A.M.A. ii./25,1758.

Intraspinal injection of 2 Cc. 0·5% solution beneficial after first injection, but second injection caused untoward symptoms. Effect may be cumulative.—Z. Bercovitz, China Med. Jl., per Jl. A.M.A., Aug. 25, '28,600.

Erysipelas.—Well treated with 5% solution applied to affected area with cotton swabs once daily.—Ann. Clin. Med., Oct., '25,333.

20 cases cured or improved.—Arch. Derm. and Syphil., April, '26,465.

Gonorrhœa.—***As a vesical injection,*** 30 Cc. of 1% solution is generally used, but stronger have been employed.—*Vide* E.P., XIX., p. 483. See also Urethritis *postea*.

A valuable drug, but the stain is a drawback to its use by patient.—Young, White and Swartz, Jl. A.M.A., July 9, '21,93.

Alternate use of Silver Salt solutions and the compound for acute and chronic gonorrhœa.—Jl. A.M.A., Dec. 8, '23,1940.

Intravenous use in dose of 2 to 5 mg. per kilo weight. Results rapid and satisfactory.—Jl. A.M.A., June 14, '24,1914.—Pres., Nov., '24,392; Jl. A.M.A., June 20, '25,1891.

Intravenously in gonorrhœa and prostatis 20 Cc. 1% solution followed by severe rigor, temperature of 105° F., and passing of crimson urine. Moral effect terrific, but therapeutic effect doubtful.—L. i./28,209.

Excellent results from 2% vaginal suppositories by placing one in posterior fornix every night for 14 nights.—F. W. Johnson, Bost. M. and S.J., Feb. 19, '25,353.

A real cure in all uncomplicated cases of gonorrhœal endocervicitis.—L. Brady, Johns Hopkins Hosp. Bull., Dec., '25,400.

Quick and efficient as a vaginal disinfectant, daily swabbing for 28 days with 1% solution (after washing out vagina with weak Boric Acid solution).—R. S. S. Statham, B.M.J. ii./28,545.

Gonococcal vulvovaginitis in children well treated with 5% solution (4 weeks).—Jl. A.M.A., Feb. 2, '29,420. Where there is cervical involvement treatment with 1% ointment in equal parts of Hydrous Wool Fat and Petrolatum, instilled into the vagina.—Jl. A.M.A., Aug. 3, '29,410.

GONORRHŒA, in females, well treated by daily washing out of vagina with weak solution of Boric Acid and swabbing with 1% Mercurochrome solution. 28 days usually sufficient to render smears negative.—R. S. S. Statham, B.M.J. i./28,544.

LEPROSY.—Checks rapid retrogression, and in treatment of ulcers, the result of disintegrating tubercles, and in healing of neurotrophic ulcers. Weekly injection into a cubital vein of 2·5 mg. per kilo, using 1% solution.—Jl. A.M.A., Nov. 21, '25,1608.

MASTITIS.—Well treated with 2% solution.—Jl. A.M.A., Mar. 15, '24.

MENINGOCOCCAL MENINGITIS. Three cases successfully treated without serum by 1 in 10,000 Mercurome in 10 Cc. doses intrathecally.—R. B. Billimoria, 25th Dec., 1931.

OBSTETRICS.—Found useful.—B.M.J. ii./26,45.

A 4% solution valuable for sterilising birth canal before delivery.—Am. Jl. Obstet. and Gynec., Feb., '26,219 and July, '25,61.

Adds greatly to the mother's safety in the event of Cæsarean section.—Am. Jl. Obstet. and Gynec., per Jl. A.M.A., July 13, '29,150.

OCULAR DISEASE treated by Drops, Ointment 1%, and a 1% or 2% Paint.

CONJUNCTIVITIS—paint both lids at once—cuts short duration. Invaluable in chronic cases. Superior to Silver: less irritating: cannot damage cornea. Two paintings a week. PARINAUD'S CONJUNCTIVITIS cleared up. Maternity Department of Bristol Royal Infirmary issues 1% solution instead of Silver for the eyes of new-born babies. Decrease of ophthalmia neonatorum. CORNEAL ULCERS can be painted with benefit. BLEPHARITIS benefited by painting. In ophthalmic surgery 1% is painted over the skin of the eyelids.—E. R. Chambers, B.M.J. ii./30,992.

PARINAUD'S CONJUNCTIVITIS cleared up in 2 weeks by drops: also useful in tuberculous conjunctivitis and in chronic dacrocystitis.—J. Cole Marshall, B.M.J. ii./30,1102.

Induction of labour by 0·5% Mercurochrome in Glycerin through a catheter into the uterus. Succeeded in about 66% cases. In uterine sepsis 1% by intrauterine injection almost invariably cures.—R. Kelson Ford, B.M.J. ii./30,727.

OTITIS MEDIA.—4 applications (a few drops) of a 5% solution in 50% spirit completely cleared a case outstanding for many months.

OTORRHŒA.—5% solution in 50% Alcohol dropped into the canal and middle ear.—Jl. A.M.A. ii./25,1251.

PLAGUE.—As it has been of value in Rocky Mountain Spotted Fever, its use is suggested in plague, beginning possibly with 20 Cc. of 1% solution intravenously, pushing the dose in severe cases. Risk of ptyalism combated with Sodium Thiosulphate intravenously, if needed.—A. Balfour, B.M.J. ii./25,1081.

PNEUMONIA.—Intravenous injections in children, of 0·005 Gm. per kilo weight; improvement in few hours; disease runs much shorter course.—Am. Jl. Dis. Child., Sept., 1924.

Brilliant results in post-influenzal pneumonia. 1 Cc. of 1% solution intravenously for every 10 lbs. weight.—Followed by severe reaction. A mild form of stomatitis rarely seen.—W. E. Deeks, Int. Conf. on Health Prob. in Trop. Amer., 1924,833.

Streptococcal lobar pneumonia, of 5 cases 4 treated recovered, and the fifth treated on purely orthodox lines died. Daily intravenous injections for 3 days of 10 to 15 Cc. of 0·5% solution. Injections must be made slowly and larger doses are not recommended.—A. H. Douthwaite, L. i./29,359.

Mercuric Chloride and Mercurochrome intravenously retained as a desperate last throw.—P. H. Mitchiner, L. i./31,350. J. Burnford, however, could speak of absolute cure of staphylococcic pyæmia after using Perchloride.

Though far from being an ideal blood antiseptic, it is perhaps the nearest approach that we at present possess.—Sir T. Horder, L. i./32,171.

Rheumatism, Articular.—Aspiration of an arthritic knee joint and injection of 1% Mercurochrome in Glycerin cleared up.—R. Kelson Ford, B.M.J. ii./30,727.

Schistosomiasis.—In early stages with no serious complications and when hæmoglobin count is 70% or over.—China Med. Jl., May, '26,440.

Septicæmia.—Septicæmia, retroperitoneal infection, pyonephritis and *B. coli* urinary infection well treated. Dose 5 mgr. per kilo.—Pres., June, '24,242; Jl. A.M.A., '24, Mar. 1, 669—675.

23 Cc. of 1% solution given as last resort in case of puerperal septicæmia. Patient recovered.—W. M. Bowman, Virginia, M., July, '26,231.

In puerperal sepsis (*e.g.*, a hæmolytic streptococcus). Intravenously disappointing, but more hope if infection due to *B. coli*.—L. C. Rivett, B.M.J. ii./30,866.

10 to 15 Cc. of a 0·5% solution intravenously on alternate or even successive days—successes recorded. Dangers are thrombosis and renal insufficiency.—Sir Thos. Horder, B.M.J. ii./31,593.

No direct germicidal action by intravenous injection is possible. In septicæmia more harm than good.—P. H. Mitchiner, B.M.J. i./31,267.

Routine vaginal injection of 5 Cc. of a 2% Glycerin solution, prior to vaginal examination, the best preventive of puerperal sepsis, repeated every morning. In cases not advanced apply diaper and keep patient in bed for an hour.—C. L. Somerville, B.M.J. i./32,96.

Skin Diseases.—Erysipelas, furuncles, carbuncles, chancroidal ulcerations, cellulitis, abscesses, gas gangrene, pemphigus, psoriasis, eczema and leprosy treated.—Young, Hill and Denny, Arch. Derm. and Syphil., April, '26,465.

Typhoid.—Intravenously, reduced stay in hospital to one-third or half the average time.—Pres., Jan., '25,54. Good results in 8 cases in children with 1% intravenously. 3 mgr. per kilo did not produce reaction.—China Med. Jl., Jan., '26,71.

Early treatment essential. *Dose.*—23 Cc. 1% solution per 100 lbs. body weight. Of 14 cases treated, in 8 only 2 injections were needed, and in 6 only one.—H. H. Morris, China Med. Jl., per Jl. A.M.A., Aug. 4, '28,358.

Urethritis.—60 cases gonococcal urethritis well treated with 2·5% solution, 26 days being average length of time to effect cure.—Jl. A.M.A., May 20, '22,1482. 187 cases.—Jl. A.M.A., July 9, '21,93.

For the inflamed urethra in gonorrhœa the ideal antiseptic is not yet found. Mercurochrome is penetrating, irritating, and disappointing.—H. D. L. Spence, L. i./30,19.

General References.—Of definite value in 150 cases of acute bacterial infections. 10 Cc. of 1 in 200 solution in saline the maximum dose, and after 2 or 3 doses of this strength reduce to 1 in 500. If the correct dilution is used it can be given repeatedly. Keep patients warm and give Aspirin in hot tea after injection.—L. S. Dudgeon, L. i./26,172.

According to the Fruit Company Report for 1924 and 1925, it is of great value in the Tropics in a variety of conditions.

A general review of infections treated. 74·4% cured or improved, in 2·6% action was doubtful, 3·4% showed temporary improvement, and in 19·6% the treatment failed. The febrile reaction seems very important, though with small doses splendid results are obtained.—H. H. Young, Jl. A.M.A., Oct. 23, '26,1366—1372.

Not a dangerous drug to use and its many users in other countries are convinced of its merits.—Prof. W. E. Dixon, B.M.J. i./28,897.

Beginning with 2 mgr. per kilo, or 10 Cc. of 1% solution per 100 lbs. body weight, and gradually increasing, at intervals of 2 to 4 or 5 days, about 3 Cc. at a time, transitory albuminuria is rare and cases of persistent albuminuria unknown.—Jl. A.M.A., April 28, '28,1397.

Bactericidal power of the blood stated to be reduced. Standardisation desirable.—Sir W. H. Willcox, B.M.J. ii./30,866.

Histological stain. Starch stains readily, showing stratifications.—Y.B.P., '26,71.

A large number of abstracts dealing with Intravenous use, toxic effects, margin of safe and toxic dose, idiosyncrasy, hypersensitiveness and uses in affections other than those now cited are provided in Edn. XIX, p. 479—490.

Bactericidal Action.

The results of the author's examination (in 1925) are in Vol. II, Edn. XIX, p. 275.

After Mercurochrome, rabbit blood was found to be bacteriostatic and occasionally bactericidal for colon bacillus for 5 hours; the urine for about the same time.—H. H. Young and Co-workers, Jl. Ph. Exp. Ther., Mar., '24,139.

In vitro, 0·1% kills *B. Coli* and *Staphylococcus aureus* in urine in one minute. —Jl. Am. Med. Assn., 1919, 1483, abst. P.J. i./20,6. B.M.J.E. i./20,20.

The activity of Mercurochrome is reduced if not in immediate contact with the infecting organisms. It is feebly effective in streptococcal infections, both subcutaneously and intraperitoneally.—E. L. Walker, Jl. Ph. Exp. Ther., XXVI., No. 6, p. 461.

Added to human defibrinated blood outside the body it in no way enhances the bactericidal power of the blood: injected intravenously it does not increase the bactericidal action tested shortly afterwards, and no special antiseptic properties are conferred on the bile by such injection.—L. Colebrook and R. Hare, Brit. Jl. Exper. Path., April, 1927, per L. i./27,1195.

A method of testing chemical compounds for their therapeutic efficiency in experimental staphylococcic septicæmia in rabbits, Mercurochrome and similar dyestuffs being used in the investigation.—G. W. Raiziss and co-workers, Jl. Ph. and Exp. Ther., Jan., '26,447.

The action of Mercurochrome, Gentian Violet and Acriflavine in experimental bacterial infections.—E. L. Walker and M. A. Sweeney, Jl. Ph. and Exp. Ther., Jan., '26, p. 461.

Lethal concentration of Iodine against *S. aureus* about 1 in 10,000—Mercurochrome 1 in 10,000,000—roughly 1,000 times stronger.—R. B. Blair, B.M.J. ii./30,194.

In blood Mercurochrome is a very weak germicide.—L. P. Garrod, B.M.J. i./31,268.

Organic Mercury Compounds (Various).

Rabbits experimentally infected with *Staphylococcus aureus* are beneficially influenced by the intravenous injection of the following compounds 48 or 72 hours after infection: Metaphen, Mercurochrome 565 (Mercury derivative of Rose-Benzol 3B) and Benzurin (Mercury derivative of Benzopurpurin 4B). The results with the last compound were particularly promising.—Jl. Ph. Exp. Ther., '26,26,447.

Chloro-Mercury-Fluorescein. A compound from which Phenol-sulphone-phthalein is eliminated in the urine has been given *per os* as urinary disinfectant.—L. i./22,147.

Experimental nephropathy produced by **tetrahydroxymercuri-phenolsulphonephthalein.**—Burns and co-workers, J.C.S.A. i./20,610.

Ⓟ ✱**Novasurol** (T.M. 421577). *Syn.* MERBAPHEN.

A double salt containing Sodium Oxymercuri-orthochlor-phenoxylacetate, $HOHg.C_6H_3Cl.O.CH_2COONa$, and Veronal. Mercury content about 34%. Readily soluble in water.

Dose.—An initial dose of 0·5 *Cc. of a* 10% *solution was advised.*

It causes profuse and rapid diuresis when injected intramuscularly or intravenously. See Edn., XIX., p. 491, but the compound has been criticised adversely.

Animal experiments suggest that in long-standing heart disease the dose should be considerably reduced: intravenous injection preferable to intramuscular.—P. Lazarus-Barlow, L. i./28,128.

1 Cc. intramuscularly with 120 grains Ammonium Chloride *per os.*—Sir J. H. Broadbent, L. i./30,28,1326.

Mercury and Arsenical diuretics considered dangerous in uremia.—A. A. Osman, B.M.J. i./30,337.

CARDIO-VASCULAR SYPHILIS.—Novasurol discussed. Toxic properties. ***Use in general abandoned. One of the most dangerous and toxic drugs*** ever put into the hands of the profession—various speakers.—B.M.J. ii./30,1047.

Doubtful whether advantage of giving Mercurials is worth the risk.—A. Gainsborough, B.M.J. ii./30,1048.

May produce striking diuresis. A dangerous remedy in its liability to produce Mercury poisoning.—Maurice Campbell, Pr., Jan., '31,34.

Novasurol and heart failure. In Graves' disease, used in conjunction with Ammonium Chloride is more effective than alone. Toxic symptoms not seen.—J. R. Armstrong, L. i./31,808.

✱Ⓟ**Salyrgan,** (T.M. 451100). *Syn.* Mersalyl, Mercurgan. Sodium hydroxy - mercuric - methoxy - propyl - carbamyl - phenoxy - acetate, $Na\ OOC.CH_2.O.C_6H_4.\ CONH.C_3H_5.(O.CH_3)\ (HgOH)$.

Dose.—Initial dose, intramuscularly or intravenously, 0·5 Cc. 10% solution to test tolerance, increased to 1 or 2 Cc. (max.) if required. Injections at 3 to 5 day intervals.

Prepared by the action of Mercury Acetate and Methyl Alcohol on Salicyl-allyl-amido-acetic-acid, and subsequent conversion to the Sodium salt. Contains 39·6% Mercury in a non-ionisable form.

Uses.—Chiefly used as a diuretic in ascites and œdema of cardiac and cardio-renal origin, and in ascites resulting from cirrhosis of the liver.

Contraindicated in acute disease of the kidneys and advanced nephritis.

Intravenous route gives better and quicker response. Diuresis begins in 1—4 hours and is complete in 8—12 hours: best given in the morning. Ammonium Chloride, 8—15 Gm. daily, for 3 or 4 days before injection, improves response.—G. W. Collins, Jl. A.M.A., Dec. 28, '22,1994, per Pres., Feb., '29,71.

In preference 2 Cc. is diluted with 10 Cc. of Saline and given slowly intravenously. In œdema of renal origin with blood pressure and blood urea normal the preparation is useful and probably safe.—Izod Bennett, B.M.J. ii./30,1047.

Severe toxic effects from intravenous injection of doses larger than stated *antea.*—C. T. Andrews, L. ii./31,132.

As diuretic used in 60 cases.—B.M.J.E. i./31,65.

Ⓟ**Meroxyl.**

A mixture containing approx. 50% of the Sodium Salt of 2:4-Dihydroxy-3:5-dihydroxy-mercuri-benzophenone-2¹-sulphonic Acid with Ammonium 2:4-Dihydroxy-benzophenone-2-sulphonate, Sodium Acetate and Water.

Wet dressings and irrigation of wounds 0·1% solution. For urinary affections 0·5% solution.

Ⓟ**Metaphen.** 4-NITRO 3:5-BISACETOXYMERCURI-2-CRESOL.

For use on infected areas, skin sterilisation and instruments and hands, and in wounds and open cuts: also for instillation in gonorrhœa, and in ophthalmology. Stated to be 11 times more potent than Mercuric Chloride, and several hundred times more than Phenol. Is only slightly irritating to skin and mucous membranes in therapeutic dilutions. Usually employed in 1 in 5,000 solution, though up to 1 in 100 may be used.

In rhinology it is a useful antiseptic with a shrinking action like Adrenalin, without reaction.—Thacker Neville.

✱Ⓟ**Neptal.** (T.M. 482137). Hydroxymercuripropanolamide of Ortho-acetyloxybenzoic Acid.

A mercurial diuretic used in nephritis, œdema of cardiac or renal origin, and in pleural or pericardial effusions. It is stated to be free from toxicity in therapeutic doses, and to have rapid and prolonged action. Ampoules contain 1 Cc.

★ Ⓟ **Merodicein** (T.M. 513602). A Mercury-iodo-Resorcin Sulphonephthalein. Active against B. Typhosus. *Per os* has low toxicity.—D. I. Macht, Jl. Pharm. & Exp. Ther., Nov., '31.

Legally none of the last mentioned are Poisons but they should be.

For further Organic Mercurial Compounds see Vol. II.

HYDRASTIS RHIZOMA.

Syn. GOLDEN SEAL.

NOTE.—*The preparations of this drug should be treated as Poisons in view of their uses, though we know of no actual fatalities from them.*

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

The dried rhizome and rootlets of *Hydrastis canadensis* (*Ranunculaceæ*). *B.P.* '14, not standardised. U.S. is standardised to 2·5% alkaloids (Ether soluble). Hydrastis Leaves and Tops also contain Hydrastine.

For assay and data on Chemistry of the Alkaloids, cf. Vol. II.

Uses.—*Internally* it has tonic properties,—action not unlike that of quinine. Is used in intermittent fevers. The drug and its alkaloids cause uterine contraction and are remedies in menorrhagia and dysmenorrhœa. Contains Berberine in addition to Hydrastine (1·5 to 3%). The best stimulant in gastric catarrh from chronic alcoholism. It is useful in fibroid tumours; does not cause painful contractions. It has been used locally in chronic pharyngitis and in goitre.

Externally in chronic inflammation of the mucous membrane, also for cracks and fissures of the nipple. It stimulates ulcers, and as a lotion (1 in 20 of liquid extract) checks profuse sweating, employed in acne and seborrhœa. In gonorrhœa, both locally and internally is of value; as an injection 1% solution of the liquid extract (or combined with 1% of Protargol and 5% Glycerin) is recommended.—H.

Ⓟ **Infusion** of 1 drachm in 8 ounces boiling water useful in vaginal gonorrhœa and leucorrhœa.—H.

Flavoring Syl Lavandulæ. Glyl or Syl Pini (in bold dose).

Ⓟ **Extractum Hydrastis Liquidum.** (*B.P.* '14.).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**) Is made with 60% alcohol, standardised to 2% Hydrastine. FR. CX. extracts with 70% alcohol.

℞ **Mistura Hydrastis et Ergotæ.**

Liquid Extracts of Hydrastis and Ergot of each 30 minims, Chloroform Water to 1 ounce for a dose.

This is one of the most powerful remedies for menorrhagia, and so also is a mixture of Hydrastis and Hamamelis.—W. W. W.

Ⓟ **Mistura Hydrastis Composita, W.**—Liquid Extract of Hydrastis and Liquid Extract of Hamamelis each 15 minims, Cinnamon Water to 1 ounce.

Ⓟ **Extractum Hydrastis.** *Syn.* HYDRASTINUM.—Prepared by alcoholic extraction. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**).

Uses.—Aperient, cholagogue, stomachic, and tonic, 3 to 6 grains in a pill, followed by Effervescing Sodium Sulphate. is a useful biliary stimulant and has been used as a dressing to ulcers.

℗ **Hydrastina, Hydrastine.** FR. CX.
$C_{21}H_{21}NO_6$=383·1718.

Dose —$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**). FR. CX. has max. single dose 1½ grains, max. during 24 hours 4½ grains approx.

An alkaloid in white prismatic crystals, slightly soluble in water, but soluble in alcohol 90% 1 in 150, chloroform 1 in 2, and ether about 1 in 90 ; taste very bitter.

℗ **Hydrastinæ Hydrochloridum.** $C_{21}H_{21}NO_6HCl$=419·6366. +Aq.
Dose.—$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**).

A crystalline soluble salt ; said to act as an expectorant.

A crystalline soluble salt ; said to act as an expectorant.
M.Pt. is stated to be 116° C. when dried near 100° C. the M.Pt. is 168° C.—D. B. Dott.

Found to produce uterine action and induce abortion, without danger to the patient, injected hypodermically.

℗ **Tablets, Hydrastine Compound.**—Hydrastine Hydrochloride ¼ grain, Ergotin ½ grain, Cannabin Tannate ½ grain. Efficient in checking menorrhagia and post-partum hæmorrhage.

℗ **Hydrastininæ Hydrochloridum.** FR. CX., P. ITAL. V., P.G. VI., P. BELG. IV., $C_{11}H_{11}NO_2.HCl$=225·5586.

Dose.—$\frac{1}{2}$ grain (**0·03 Gm.**) *per os* or hypodermically in 10% solution. FR. CX. has max. single dose ¾ grain ; max. during 24 hours 2¼ grains approx. P. Belg. IV. has 30 mgr. and 100 mgr. respectively.

A salt of ℗ **Hydrastinine,** $C_{11}H_{11}NO_2$=189·0938+Aq. (FR. CX.). An oxidation product of Hydrastine, is allied to Cotarnine. It is probably the active constituent of the drug.

In pale citron yellow crystals, ***soluble*** 1 in 1 of Water. M.Pt. 212° C. Has been used for internal hæmorrhage hypodermically. Useful in menorrhagia and dysmenorrhœa.

Ⓟ **Sterules, Hypodermic of Hydrastinine Hydrochloride** contain ¼ and ½ grain (**0·016** and **0·03 Gm.**).

Ⓟ **Tinctura Hydrastis** (*B.P.* '14).
Dose.—30 to 60 minims (**2 to 4 Cc.**).
Prepared 10% of the Liquid Extract in Alcohol 60%.
FR. CX.—1 in 5 of the root by weight. Not standardised.
Flavoring.—As Extractum Hydrastis Liquidum *q.v.*

Ⓟ **Liquor Sedans.** *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

A specialty said to contain in 1 ounce Hydrastine (representing Fluid Extract of Hydrastis 30 minims) ; Black Haw (*Viburnum Prunifolium*) 60 grains ; Jamaica Dogwood 30 grains ; with aromatics. To restrain nervous irritability and as ovarian and uterine anodyne.

HYDROGENII PEROXIDI LIQUOR.

H_2O_2=34·0156.

Syn. **Soluté officinale d' Eau Oxygénée.** Fr. Cx. 12 vol. 'Hydroxyl.'

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

May be prepared by the action of diluted sulphuric acid on barium peroxide in presence of water.

Electrolytic method by treatment of Sulphuric Acid in the presence of Hydrochloric Acid or Hydrofluoric Acid. $H_2S_2O_8$ (Persulphuric Acid is first made).—P.J. i./16,3.

1 Cc. of the *B.P.* '14 Liquor yields 10 Cc. of oxygen, or 1·45% of its weight=3·04% by weight H_2O_2. It has the second atom of oxygen in loose combination. Twenty volume strength is also available.

Hydrogen Peroxide is produced naturally in many ways, as by the oxidation of oil of turpentine, oil of eucalyptus, etc. It is contained in 'Sanitas,' *q.v.* The solution is used for bleaching hair. It has a harsh bitter taste.

Incompatibility.—It readily decomposes, especially in contact with metallic oxide, such as that of Silver or Manganese, these if moist and freshly precipitated cause oxygen to be briskly evolved from it. Ether restrains this decomposition and is used for making Ozonic Ether.

Further incompatibilities are Alkalis, Ammonia, Arsenious Salts, Carbolic Acid, Glycerin, Hypophosphites, Iodides, Mercurous Salts, Potassium Bromide, Chlorinated Soda and Chlorine Water.

Borax is frequently prescribed with Hydrogen Peroxide to neutralise acidity, but the product is very unstable—a sample titrating 11 vols. entirely decomposed within 21 days.—P.J. i./25,549.

For Assay and Preservation, see Vol. II.

Uses.—Internally is non-poisonous and has been given for pertussis, flatulent dyspepsia and other affections, but now it is mostly employed locally. It is useful for assisting in removing surgical dressings which adhere obstinately. It is valuable, used *undiluted,* as a pigment or spray for diphtheria, tonsillitis, laryngeal tuberculosis, stomatitis, putrid bronchitis and non-syphilitic ozæna. For tuberculous and syphilitic ulcers, gangrene, malignant pustule and for purulent discharges it is antiseptic. It is astringent, *e.g.*, in epistaxis, and styptic in removing polypi. Does not precipitate albumin. May be used locally for inoperable uterine cancer, chilblains, lupus, favus and other skin affections, also in gonorrhœa (up to 10 volume strength) occasionally. Wasp and hornet stings are at once relieved.

Diphtheritic conjunctivitis is treated with a 10% dilution of the official Liquor. Empyemal cavities have been washed out with diluted solutions, but danger has arisen from embolism by the oxygen evolved. Also employed well diluted in *erysipelas*, and as an enema in *dysentery.*

Fistula. For cleaning up unhealthy germinating areas and blind pockets, Hydrogen Peroxide is invaluable—on no account should Silver Nitrate be used for this.

Hay Fever is treated by spray of Hydrogen Peroxide into the nose, and on the conjunctiva it proved efficacious.

Otorrhœa and Otitis may be treated with the 10 volume solution preferably diluted with equal volume of water. After syringing out with weak boric acid lotion, allow to remain in 15 minutes, syringe out again, and dry carefully.

Dangers of Hydrogen Peroxide in treatment of otorrhœa. In contact with pus it yields a large quantity of Oxygen which may cause serious symptoms and even death. Pres., Feb. '26,69.

Gangrene of scalp following use of a 30% solution of Hydrogen Peroxide for bleaching the hair.—B.M.J.E. i./26,64.

PURULENT CONJUNCTIVITIS (gonorrhœal and membranous) is treated with 10 volume Hydrogen Peroxide. In the former case used as warm douche (104° F.) destroys gonococci. Will reduce corneal opacity.

Neutralising Hydrogen Peroxide Solution with Calcium Carbonate and filtering is said to obviate the pain caused by syringing wounds in the ear with the ordinary acid preparation. This, of course, must be done only at the time of use as the solution would thus rapidly lose its strength.—H. Finnemore, P.J. i./14,421.

Guttæ Hydrogenii Peroxidi et Spiritus, St. Th. H.

Hydrogen Peroxide 10 vols. and Methylated Spirit, equal parts. Used as ear drops.

Gargarisma Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 1 drachm, Sodium Chloride 5 grains, Glycerin 30 minims, Water to 1 ounce. (*Caution.—In a strong bottle.*)

Collutorium Hydrogenii Peroxidi. Hydrogen Peroxide Mouth Wash.

Hydrogen Peroxide Solution (20 volume) 500, Oil of Peppermint 1, Saccharin Elixir 30, Thymol Water 470.

Astringent Hydrogen Peroxide Mouth Wash.—*Martindale.*

The above with 5% of Solution of Aluminium Acetate added.

Dilute either of the above with 7 parts of water.

For painful ulcers of the mouth in syphilis.

Lotio Salox V.H.C.

Hydrogen Peroxide Solution (20 vol.) 907, Sodium Chloride 85, Boric Acid 12. For use add one part to 4 of water.

Unguentum Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 10, Anhydrous Wool Fat to 100. To be freshly made. Useful in eczema and other parasitic skin affections.

Dental Use.—The 20-volume strength can be used for acute or chronic and gouty periodontitis by syringing out pockets around affected teeth. Also for septic root canals.

Ozonic Ether.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A solution of about 1·2% by weight of H_2O_2 in ether (*i.e.*, 4 volumes approximately). It is miscible with water in all proportions up to three times its volume, possesses properties similar to the above, and is more stable. In conjunction with Tincture of Guaiacum, it is employed as a test for blood, *v. Vol. II.* Has been given internally for diabetes and whooping-cough, and used for scarlet fever. It bleaches discoloured teeth.

Hydrogenii Peroxidum Boratum.—BORATED HYDROGEN PEROXIDE.

Neutralise carefully (using Phenolphthalein as indicator) Hydrogen Peroxide with caustic soda. Then add 3% boric acid. The preparation is permanent, within reasonable limits.

Liberates oxygen on coming in contact with blood or other organic matter. A useful mouthwash.

Loss of sense of smell returned (to our knowledge), after the use of this preparation as a nasal lotion.

***Hyperol** (T.M. 343485 Class 3) **'Solid Hydrogen Peroxide.'**
A concentrated Hydrogen Peroxide is obtained by forming the compound with Urea, $CO(NH_2)_2.H_2O_2$ rendered stable with a trace of Citric Acid. One Gm. dissolved in 10 Cc. of water gives a solution of 10 vols. strength. The solid is stable in temperate and sub-tropical climates, but decomposes when heated to 60° C.—Analyst, '26,50.

Magnesii Peroxidum.
Dose.—15 to 60 grains (**1 to 4 Gm.**).
A white tasteless powder insoluble in water, containing about 20% of Magnesium Peroxide, $MgO_2=56{\cdot}32$, with Magnesium Oxide, and is for use where increased oxidation is desired: given for weak digestion, anæmia, and in diarrhœa of phthisis, vomiting, anorexia, flatulence and pyrosis.
5 to 10% added to precipitated or prepared chalk powder makes a good dentrifrice.

Tablets and 'Stearettes' of Magnesium Peroxide, 3 grains each are prepared.

Dentifricium Oxidans. *Syn.* OXIDISING DENTIFRICE, R.D.H.
Hard Soap and Orris Root of each 30 grains, Clove Oil 2 minims, Menthol 1 grain, Magnesium Peroxide 1 drachm, Precipitated Chalk 1 ounce.

Zinci Peroxidum. FR. SUPP. II. EKTOGAN, DERMOGEN, $ZnO_2=97{\cdot}38$.
A white powder insoluble in water. Used locally in skin affections.
Promotes healing of chronic ulcers. For burns and wounds.
Incompatible with Corrosive Sublimate. 10% **Unguentum** or dusting powder is used.

Sodii Peroxidum, Sodium Dioxide, F.E. *Syn.* OXYLITH, "SOLID OXYGEN." $Na_2O_2=77{\cdot}994$.
A yellowish white amorphous deliquescent powder, dissolves in water with production of heat and evolution of oxygen. 50% solution has been used in dentistry to whiten stained teeth. Technically used as bleach for sponges, wool, bones, oils, etc.
Unguentum Sodii Peroxidi. 20% in soft white paraffin may be tried with caution in acne.

ℙ1 HYOSCINA.

$C_{17}H_{21}NO_4=303{\cdot}1718$. (+Aq.).
A thick syrupy alkaloid, contained in *Hyoscyamus niger*, different species of *Scopola*, *Datura alba*, the flowers of which yield 0·5%, and other solanaceous plants.
It may be obtained from the Mother liquors of the preparation of Hyoscyamine. It is chemically and physiologically equal to Scopolamine. *We consider that all the compounds and preparations of this potent alkaloid in this chapter should be deemed* ℙ1 *poisons.*
For further details of the chemistry of this and allied alkaloids, Thorpe should be consulted. See also Lævo-Scopolamine *postea*.

Uses.—Hyoscine is a powerful narcotic, especially useful in cases of insomnia, in calming excitement and delirium and producing sleep in acute mania. In such cases even double doses may be given. It is said to have no influence on the respiration, but to increase the action of the heart and circulation. As little as $\frac{1}{480}$ grain dilates the pupil in 18 minutes. The mydriasis is brief. It does not cause dryness of throat. Should be avoided in acute glaucoma.
Used largely in conjunction with Morphine in labour, *v. postea*. It has been given in vomiting of pregnancy and the tremor of alcoholic excess.

CHOREA, ASTHMATIC ATTACKS, PERTUSSIS and PARALYSIS AGITANS are relieved.
Paralysis agitans treated. Give a mixture of Hyoscine 1/200 grain with Pilocarpine Nitrate 1/15 grain and min. iii. of Liquor Strychninæ four times daily, gradually increased until the tremor is controlled.—A. F. Hurst, B.M.J. i./26,845. *Vide also postea.*

PARALYSIS AGITANS. The medicament of choice.—W. Freeman, Jl.A.M.A. ii./27,1320.

MORPHINE and COCAINE HABITS are treated with it, but apparently not without danger.

NOCTURNAL SPERMATORRHŒA is checked by $\frac{1}{200}$ grain doses in Chloroform Water by the mouth.—W. W. W.

DIATHERMASIA (thermal stroke in the tropics).
Quinine is of no use if malaria has been excluded. Strychnine should be avoided. The patient should be placed in an ice pad, and a hypodermic injection of $\frac{1}{75}$th grain of Hyoscine Hydrobromide should be given to quiet the intense cerebral hyperactivity. For thready pulse $\frac{1}{100}$ grain Digitalin is useful. After diaphoresis small doses of Ammonium Bromide may be given. —Brooke.

As hypnotic, not advised in cases other than maniacal as its action is uncertain. In PUERPERAL MANIA $\frac{1}{150}$ to $\frac{1}{50}$ grain may be given *by the mouth.* To quell mania, dose of $\frac{1}{100}$ grain hypodermically has proved useful. Kidney disease and feeble state of heart do not contra-indicate its use.

SEPTIC PNEUMONIA and INFLUENZA may be cautiously treated for sleeplessness.—Sir J. Moore, Pr. January, 1919.

ACUTE MANIA. The folowing heavy doses are tolerated :—Chloral Hydrate 45 grains, Potassium Bromide 30 grains, Hyoscine Hydrobromide 1/40th grain in water to one ounce when required. (*Caution*—heavy dose). After a few doses the medicine may cease to have effect, even when the Hyoscine is increased to 1/20th of a grain. A hypodermic injection (10 minims of a ¼ per cent. solution) of Hyoscine will, however, often subdue.

Hyoscine possesses about 5 times the calmative power of Atropine or Hyoscyamine.

Hyoscine 1/150 grain, Morphine 1/3 grain. Anæsthetic for the Alcohol injection (*q.v.*) treatment of neuralgia. Give 20 minutes prior to the Alcohol. —W. Harris, L. i./13,881.

DELIRIUM TREMENS. Hyoscine 1/50 grain with Morphine 1/3 grain. A sheet anchor, but may be cumulative.—W. Starkey, B.M.J. i./20,47. (*Caution* : 1/50 grain is a big dose.—W.H.M.).

POST-ENCEPHALITIC PARKINSONISM. Hyoscine Hydrobromide produces quite definite and even marked improvement.—A. J. Hall, B.M.J. i./26,129.
Chronic encephalitis treated with Hyoscine Hydrobromide, 1/100 grain thrice daily, and with Harmine.—L. ii./29,794.

Antidotes.—Pilocarpine or Caffeine should be administered, also Tannin and Tea, after Emetics and use of stomach pump.

Hyoscine poisoning in a five-year-old boy. The child had eaten several tablets, each containing $\frac{1}{100}$ grain of Hyoscine Hydrobromide. Recovery under an injection of ¼ grain of Pilocarpine Hydrochloride.—L. ii./10,884.

℞ **Oleum Hyoscinæ,** 1% in Castor Oil. Causes a mydriasis which is certain, quick in onset and of transient effect. ℞ **Unguentum Hyoscinæ,** R.O.H. Hyoscine 1 or 2 grains. Dissolve in Chloroform and add to melted Soft Paraffin 1 ounce at not exceeding 61° C.

℞ **Hyoscinæ Hydrobromidum.** *Syn.* **Scopolaminæ Hydrobromidum,** *B.P.*'14, U.S., Ph. Ned. V., P. Jap., P. Belg. IV., F.E. VIII., P. Ital. V. $C_{17}H_{21}NO_4.HBr.3H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased to $\frac{1}{50}$ grain. P.G. VI. has maximum single dose 0·001 Gm., maximum *pro die* 0·003 Gm. *N.B.*—As initial dose we advise $\frac{1}{400}$ or $\frac{1}{300}$ grain. Patients vary in reaction.

In white rhombic crystals, soluble 1 in 4 in water (or less), 1 in 14 of alcohol. Melts at 190° to 192°C. U.S.

The pure salt (water free) has, according to Schmidt, O.R. for a 6·5% solution at 15·8° C. $[a]_D = -25°\ 45'$. Commercial Hyoscine Hydrobromide, though often less lævo-rotatory than this owing to presence of dextro or racemic Scopolamine, according to some does not differ markedly in physiological effect from that of pure **Lævo-Scopolamine.**

A recent statement, however, is that only *l*-Hyoscine is active in producing amnesia; Dextro is useless.—J. Chassar Moir, B.M.J. ii./25,514.

P.G. VI. requires a 5% aqueous solution, calculated as anhydrous salt, to have a rotation: $[a]_D$ at $20° = -24·75°$. On adding 1 drop of potassium permanganate solution (0·1%) to 5 Cc. of a 1% aqueous solution, the red colour should not disappear within 5 minutes (apoatropine).

Jowett thought that as both Lævo- and optically inactive Scopolamine occur in the plant, preparations may vary according to slight differences in ways of making.—P.J. i./13,401.

Resolution of Hyoscine and its components Tropic Acid and Oscine. There are possible four isomeric hyoscines.—H. King, C.D. '19,348.

℗ **Guttæ Hyoscinæ, R.O.H.,** 1 or 2 grains to 1 ounce.

℗ **Lamellæ** for ophthalmic use contain $\frac{1}{500}$ (R.O.H.) and $\frac{1}{200}$ grain.

℗ **Guttæ Hyoscinæ et Cocainæ, St. Th. H.**
Hyoscine Hydrobromide 0·5, Cocaine Hydrochloride 1·0%.

℗ **Injectio Hyoscinæ Hypodermica.** 1 grain in 1,000 minims; *Dose.*—5 to 10 minims.

℗ **Liquor Hyoscinæ Hydrobromidi,** 1 in 1,000 of chloroform water. *Dose per os*—3 to 15 minims (**0·2 to 1 Cc.**).

℗ **Pilula Hyoscinæ Hydrobromidi,** $\frac{1}{400}$ to $\frac{1}{150}$ grain.

℗ **Hypodermic Tablets,** $\frac{1}{400}$, $\frac{1}{200}$, $\frac{1}{100}$ and $\frac{1}{75}$ grain in each.

For general ***uses*** and References to Hyoscine Salts *vide* Hyoscine *antea.*

Scopolamine-Morphine Anæsthesia.

Scopolamine Hydrobromide $\frac{1}{200}$ to $\frac{1}{64}$ grain or more, and a salt of Morphine $\frac{1}{7}$ to $\frac{1}{2}$ grain are injected on the evening before the operation, and a similar or higher dose in the morning before the operation. This alone may suffice to produce deep sleep. If not, Ether or Chloroform may be given until complete anæsthesia occurs. Patients sleep for hours through the first painful periods after the operation.

One of the physiological effects of Scopolamine is to induce temporary loss of memory. This is made use of in the "**Twilight Sleep**" method of inducing child-birth.

The only successful method of inducing "Twilight Sleep" is to give doses according to needs. Hypodermic injection of Morphine $\frac{1}{6}$ to $\frac{1}{4}$ grain most commonly used. First dose of Scopolamine 1/150 grain; at the end of one hour a second injection of 1/450 grain is given—injected at hourly intervals controlled by patient's condition. The number of the Scopolamine injections matters little. *The Morphine must not be repeated.* Marked absence of maternal shock afterwards. Child usually born with shallow respiration, but artificial respiration improves breathing. A little Chloroform used in the late second stage, and when the head appears give $\frac{1}{4}$ or $\frac{1}{2}$ Cc. of Pituitary Extract.—A. W. Bourne, Clin. Jl., Dec. 19/23,601.

Heroin 1/16 grain with **Hyoscine** 1/150 grain and Hyoscine 1/400 grain as subsequent doses have been used.

Scopolamine-Morphine-Atropine Methods :—

Morphine $\frac{1}{6}$ grain with Scopolamine $\frac{1}{100}$ grain has been given the night before operation, after thoroughly emptying the bowel, and next morning after a rectal enema a further dose of the same quantity, and an hour before operation, *Atropine $\frac{1}{100}$ grain with Strychnine $\frac{1}{30}$ grain* is given subcutaneously. Less Chloroform is needed.—L. i./11, 737 ; B.M.J. i./11,757.

Atropine essential when 'open Ether' is used, as Scopolamine when combined with Morphine is insufficient to counteract the injurious results of unstinted doses of Ether.—Dudley Buxton, L. i./11,737.

Patients usually pass into profound sleep when operation is finished, hence need watching until narcotic effects have passed off. The stupor need not alarm if breathing is regular and adequate, and albuminuria or glycosuria are known not to be present.—B.M.J. ii./11,1150.

No risk to either mother or infant but if pushed to analgesia the risk may be grave. Remarkable absence of exhaustion and shock upon the mother.—W. O. Greenwood, B.M.J. i./17,355.

Twilight Sleep not free from danger. Consensus of views.—G. Blacker. L. i./18,430. See also B.M.J.E. i. /15, 11 ; ii./15,3.

Scopolamine Morphine narcosis in labour. In 25% of cases result very good, in 15% good, and in 10% no benefit.—J. S. Quin, L. i./29,668.

'Twilight Sleep' given as routine in hundreds of cases.—G. W. Theobald, B.M.J. ii./30,664.

Crile's Anoci-Association, *i.e.* the exclusion of all harmful associations or stimuli. Scopolamine Morphine employed also Novocain Infiltration with Solution 1 in 400. In abdominal work Quinine Hydrochloride and Urea 5% of each in Normal Saline.—H. B. Butler and E. W. Sheaf, B.M.J. ii./14,113.

Morphine alone, 1/6th grain hypodermically, repeated at various intervals throughout labour, satisfactory. The progress of the labour was found to be hurried rather than delayed.—Louise McIlroy, B.M.J. i./21,159. Endangers child's life when given repeatedly up to shortly before birth.—H. Spencer—*ibid*, 159.

In the Morphine-Scopolamine Method the child was born in 3% of cases oligopnœic—of a blue colour with very shallow breathing. In each case it recovered spontaneously—Morphine not necessarily the cause.—F. W. N. Haultain, B.M.J. i./21,341.

Specially indicated in primiparæ. Chloroform only at very end of second stage. Postpartum hæmorrhage not more frequent than usual.—N. Hirschman, B.M.J. ii./22,669.

Twilight Sleep has proved *far from satisfactory.* Diamorphine Hydrochloride analgesic but inhibits uterine contractions. A drug is needed which would give amnesia or analgesia without depressing uterine function.—Allan Vincent.

It occurred to us to suggest Hyoscyamine, as an alternative to Hyoscine. Personally, we are not surprised to find that the Morphine derivatives tend to inhibit uterine contraction. The recent use of Quinine in this matter is of interest, *v.* p. 102.

Investigation of 32 cases by a Committee appointed by the Section of Obstetrics and Gynæcology of the R.S.M. in 1917.—The average number of injections of Scopolamine was 4·5. Pituitary Extract 0·25 Cc. was given in 17 cases in the second stage. The average duration of labour after commencement of treatment was 5 hours 41 minutes in primiparæ and 6 hours 5 minutes in multiparæ. The injections caused lengthening of intervals between contractions which were diminished in strength and duration : voluntary expulsive efforts did not arise automatically : there was thirst in every case, and nausea in some : some complained of pain in second stage : there was sleep between pains in every case : general anæsthesia was induced in 10 cases. One stillbirth resulted, most babies showed apnœa, and all were thirsty for 24 hours. Amnesia and not analgesia the aim. Amnesia

was complete in 17 cases, incomplete in 12, and failed in 3. The treatment is good for the mother but needs unremitting attention from doctor and nurse. No danger with careful observation. The memory test is useless. Strict precautions must be taken to exclude all adventitious stimuli.—J. St. G. Wilson, M.P.C., Nov. 16, '27,407. *See also Gwathmey's Synergistic Theory* (*Magnesium Sulphate and Morphine*), *pp.* 101, 102.

Scopolamine in obstetrics.—Jl. A.M.A. ii./25,1155.

Three doses of Hyoscine Hydrobromide given hypodermically at ½-hourly intervals, when regular pains commence (in primiparæ when cervix is three fingers dilated), and repeat every two hours as long as labour lasts. Up to 8/100 grain used without ill effect. Chloroform given in second stage. Important not to omit last (third) injection even if child about to be born. Excellent results and no ill-effects on babies.—A. M. Claye, B.M.J. ii./31,12.

℗1 **Hyoscine** 1/100 grain in 2 Cc. **50% Magnesium Sulphate** solution adopted as routine as a reasonable analgesic in labour. Safe and fairly effective. One dose usually enough.—R. Kelson Ford, B.M.J ii./30,726.

℗1 **Sterules** containing **Hyoscine Hydrobromide** 1/100 grain and in 50% **Magnesium Sulphate** 2 Cc. are made.

℮℗1 **Sterules, Hypodermic for Scopolamine-Morphine Anæsthesia** contain Scopolamine Hydrobromide $\frac{1}{100}$ grain with Morphine Hydrochloride $\frac{1}{6}$ grain in 15 minims.

℗1 **Sterules of Atropine Sulphate** $\frac{1}{100}$ grain with **Strychnine Sulphate** $\frac{1}{30}$ grain in 10 minims are for use with these as above mentioned. They are also made with $\frac{1}{60}$ grain of Strychnine Sulphate,

℮℗1 **Compound Scopolamine (Hyoscine) Sterules** contain Scopolamine $\frac{1}{120}$ grain and Morphine $\frac{1}{8}$ grain with Atropine Sulphate $\frac{1}{120}$ grain in 15 minims of water.

℮℗1 **Compound Scopolamine (Hyoscine) Tablets** contain the same ingredients as the last.

℗1 **Scopolamine Hydrochloride** ($+2H_2O$) and ℗1 **Hydriodide** have properties and doses analogous to the Hydrobromide.

Genoscopolamine. Stated to be the Nitrogen- oxide of Scopolamine.

Dose.—2 to 4 mgr. ($\frac{1}{30}$ to $\frac{1}{15}$ grain) *during a day.*

Genoscopolamine Granules are made, each containing 0·0005 Gm. *Dose* 4 to 8 granules *per day* agreeing with the above.

PARKINSONISM.—It reduces rigidity, muscular hypertonus, tremor and excessive salivation. This substance has a therapeutic action similar to Scopolamine but is less toxic—the administration may be continued for months.—M. Polonovski and others, L. i./26,929. See also ***Stramonium.***

℗HYOSCYAMI FOLIA.

JUSQUIAME.—FR. CX. *Dose.*—3 grains (0·2 Gm.) U.S.

Henbane Leaves consist of the fresh leaves; also the leaves and flowering tops separated from the branches and carefully dried. Collected from the flowering plants.—*B.P.* '14, not standardised, *cf.* U.S., etc., *infra.* The *B.P.* '14 leaves conform with F. I.

Cultivation.—For details see Vol. II.

Drying of Solanaceous drugs. Sun *v.* Shade. No apparent difference in alkaloidal content of Hyoscyamus and Belladonna. Datura however dried in the shade showed 10% more alkaloid than a sun-dried specimen. —Qtrly. Jl., Ph., 2, 31,265.

Uses.—Similar to those of Belladonna and Stramonium.

Colocynth and other strong purgatives in pills are rendered less painful in action by addition of Hyoscyamus Extract.

Hyoscyamus (Tincture) contains varying amounts and proportions of Hyoscyamine and Atropine and a varying amount of lævo and inactive Scopolamine. The physiological activity of stereoisomerides varies.—H. A. D. Jowett.

U.S. directs dried leaf with or without tops, containing not less than 0·065% alkaloids and not more than 25% of stems, none more than 7 mm. thick. **P. Helv.** required 0·1% alkaloids.

℗1 **Extractum Hyoscyami** (*B.P.* '14).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

This differs from **Extractum Hyoscyami Viride**, *B.P.* '98. It is an alcoholic extract of the leaf, made with 70% Alcohol and conforming with F.I., and is standardised (*B.P.* '14) and P. Belg. to 0·3% alkaloids. U.S. X. has 0·25%, P. Ital. V. and F.E. VIII., 0·5% Alkaloids. Glucose is used as diluent.

Hyoscyamus Extract contains 0·3% mydriatic alkaloids, including Atropine, and any preparation of Belladonna containing 0·1% or more is a Part I. Poison.—Rutherford Hill, P.J. i./26,13. We agree. *Cf.* note under Hyoscine.

P.G.VI. Contains 0·5% Hyoscyamine.

℗ **Tinctura Hyoscyami** (*B.P.* '14).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Powdered Hyoscyamus leaves 1 in Alcohol 70% to 10. This conforms with F. I.

Flavoring.—Syl Aurantii Amari, Syl Vanillæ; Syrupus Aurantii Floris.

The pain due to pyelitis may sometimes be controlled by Hyoscyamus Tincture in doses of ½—1 drachm.—Tirard.

Baume Tranquille. Fr. Cx. (Huile de Jusquiaume Composée). Macerate powdered leaves of Belladonna, Hyoscyamus, Solanum Nigrum, Poppy and Stramonium of each 50, with alcohol 200, and allow to stand 24 hours: then add Poppy Seed Olive Oil 5000, warm for 6 hours at 60 to 70° C. Press and allow to deposit, and finally add Oils of Lavender, Peppermint, Rosemary and Thyme, of each 1, and filter.

℗ **Fluidextractum Hyoscyami, U.S.** *Average dose.*—3 minims (**0·2 Cc.**). Strength 1=1; hydro-alcoholic percolate, standardised to 0·065% Hyoscyamus alkaloids.

The dried leaves are said to contain as much as 0·25% of total alkaloid (of which ¼ to ¾ may be Hyoscyamine) together with small amounts of Hyoscine and Atropine. The minute dark grey seeds of the plant contain 0·5% alkaloid, also a quantity of oil.

Fr. Cx. employs the seeds in ℗ ℗1 Pilules de Cynoglosse opiacées.

Hyoscyamine is also contained in *Atropa Belladonna, Duboisia myeporoides, Datura Stramonium, Scopola Carniolica, S. Japonica,* and other atropaceous plants.

Hyoscyamus muticus. **Egyptian Henbane** has been found to contain 0·91% Alkaloids by titration. Costs less than 1/20 of the medicinal drug. Has been imported in America and diluted with inferior Henbane, as it contains 1 to 1·25% Hyoscyamine. It grows wild all over Egypt, where it is known by the name of 'Sakran,' the drunken. The alkaloid it contains is practically pure Hyoscyamine.

It is now a drug of extreme importance as a source of Atropine—the hyoscyamine contained is easily converted into Atropine,—*vide* Hyoscyamine *infra*.
This lævo-Hyoscyamine has been suggested to replace Atropine for ophthalmic work—*vide* Atropine.

Ⓟ **Meglin's Pills.**—Hyoscyamus Extract, Valerian Extract, and Zinc Oxide each 1 grain.—In sciatica.

Lactucarium, U.S. IX. *Average dose.*—15 grains (**1 Gm.**).
The concrete milk juice of *Lactuca virosa* (*Compositæ*), the strong scented lettuce. Hyoscyamine is said to be a constituent of the fresh plant. Brownish masses with Opium-like odour and bitter taste, partly soluble in Alcohol and in Ether. **Tinctura Lactucarii, U.S.** 1 in 2. *Average dose.*—30 minims. **Syrupus Lactucarii, U.S.** (1 in 20). Tincture of Lactucarium 100, Glycerin 200, Citric Acid 1, Orange Flower Water 50, Syrup to 1,000. *Average dose.*—2 drachms for insomnia.
The Iron content of lettuce is said to vary from 0·00972% to 0·00033%, the variety richest in Iron content being "May King," and the poorest, the Cos Lettuce. Description of estimation.—A. Lichtin, per P.J. i./23,358.

ℙ1 HYOSCYAMINA.

$C_{17}H_{23}NO_3 = 289·1874$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), in cases of mania, increased to $\frac{1}{16}$ or $\frac{1}{8}$ grain dissolved in water by means of diluted sulphuric acid, or in a pill. ***Antidotes.*** *See* Atropine.

An alkaloid obtained from *Hyoscyamus niger* and other Solanaceous plants. It is a stereo-isomer of Atropine (which is inactive), into which it can be converted by heating or acting upon it with alkali. It is in light snow-white crystals. O.R. of Solutions of Hyoscyamine is $[a]_D = -20·97°$.

Soluble 1 in 120 of water, freely in alcohol, chloroform and ether. Is alkaline in reaction, and melts at 108°—109° C.

It has been found in *Scopola Japonica*—*q.v.*

ℙ1 **Hyoscyaminæ Hydrobromidum,** $C_{17}H_{23}NO_3HBr = 370·1112$.
Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased.
In small white crystals, soluble about 2 in 1 water.
Does not yield precipitate with platinic chloride (difference from most alkaloids) U.S. M.pt. 152° C.

Ⓟ **Hypodermic Sterules** of **Hyoscyamine Hydrobromide** contain $\frac{1}{100}$ grain (**0·0006 Gm.**) in 15 minims. (**1 Cc.**).

ℙ1 **Hyoscyaminæ Sulphas** (*B.P.* '14).
$(C_{17}H_{23}NO_3)_2H_2SO_4,2H_2O = 712·4816$.
Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**).
In small white granular deliquescent crystals, soluble in water 2 in 1 and about 1 in 4 of alcohol 90%.

ℙ1 **Hypodermic Tablets of Hyoscyamine Sulphate** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain. ℙ1 **Ophthalmic Discs** contain $\frac{1}{500}$ grain.

ℙ1 **Guttæ Hyoscyaminæ** (*vel* **Daturinæ**) **R.O.H.** 0·25%.

ℙ1 **Granules** of **Hyoscyamine** $\frac{1}{100}$ grain (**0·0006 Gm.**) are used for sea-sickness. *Dose*, one occasionally a day or so beforehand, and for the first few days on board; hourly if required.

Uses.—As a mydriatic it acts like Atropine, but with greater intensity, while the duration of effect is about equal.

It removes the pain of neuralgia and is given for mental excitement, *e.g.*, delirium tremens. In mania $\frac{1}{8}$ grain may be given hypodermically.

Criminology.—Suggested use of hyoscyamine to extract 'the truth' from unwilling deponents. Could not be used in this country.—L. ii./22,1191.

P1 **Duboisine** from the leaves of *Duboisia myoporoides* is identical chemically with, and physiologically similar to Hyoscyamine. It is in amorphous very hygroscopic granules.

ICHTHOSULPHOL.

✱Ichthyol. T.Ms.—See 39599(Class 2) and 39600(Class 3), (Names and Designs). 59155, 6 and 7 (Classes 2, 3 and 48 resp.). ✱Ichthyolate, No. 64841, and ✱Ichthyolicum 64842. *Syn.* ✱Saurolo (T.M. 324693). Ammonium Sulpho-Ichthyolate. **P. Ital. V., F.E. VIII.** Ammonium Bithiolicum. **P. Belg. IV., P. Jap.**

Patents 10,523/1884 and 6044/1893 ***Expired.***

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) per diem.

A viscous, brownish substance, with a disagreeable odour obtained by destructive distillation of a fossil fish deposits.

The total Sulphur is 10·3% of which 8·92 is organically combined and 1·38 is in association with Ammonia. Total Ammonia 3·23%; 43·74% Water. Other refs. in 17th Edn.

Soluble in water, glycerin, chloroform; fats and oils, not soluble to any extent in Ether or Acetone.

Uses.—Internally has been given for rheumatism and skin affections, and as an intestinal antiseptic in constipation and dyspepsia. Reduces expectoration and cough. Externally it is used in chronic skin diseases, as eczema, psoriasis, acne, and favus. Applied on wool as vaginal tampon, and as pessaries and suppositories, and as injections 2 to 5% (Lock Hosp.) in gonorrhœa, cystitis and vaginal discharges. Also applied to cracked nipples and erysipelas. In furunculosis it has been well spoken of. For pruritus and ulcers a 10% solution; may be combined with lead and mercury without the formation of sulphides. For burns diluted with zinc oxide or bismuth (the powder being spread evenly over the surface), or in ointment (10 to 50%). In mumps the swelling and pain are said to be rapidly relieved by inunctions of equal parts of Ichthosulphol and Lanolin.

Albuminuria is well treated by Ichthyol internally combined with *B. Coli.* injections.—F. J. Sadler, L. i./22,930.

Erysipelas in a large suppurating wound on the arm well treated by painting with Ichthyol and Glycerin *p. aeq.* covered with oiled silk. Simultaneously a mixture containing 2 drachms of Liquor Hydrarg. Perchlor. every four hours. Wound then dressed with hypertonic Saline. Same treatment for a bad case of boils from the trenches also successful.—B.M.J. i./16,201.

Gonorrhœa treated by intramuscular injection of 2% solution Ammonium Sulpho-ichthyolate in doses of 3 Cc. every 2nd or 3rd day—diluted just before injection.—B.M.J.E. i./26,2.

Lithium and Sodium Ichthosulphol. *Dose of either.*—10 to 30 grains (**0·6 to 2 Gm.**) per diem.

Zinc Ichthosulphol, is for external use.

Capsules of Ichthosulphol and of Lithium Ichthosulphol, 4 grain (0·25 Gm.) each (or 2 grains of each). **Tablets** 2½ grains.

Collodion 7 parts, with Ichthosulphol 1 part, is used for eczema, erysipelas, and other skin diseases.

Mistura Ichthosulphol. *Dose.*—1 to 3 drachms in water.

Ichthosulphol 6, Simple Elixir 20, Water 10. Another form: Ichthosulphol 2, Peppermint Water 7½, Syrup 2½.

Pilula Ichthosulphol.

Ichthosulphol 2½, Compound Tragacanth Powder ½, Liquorice Powder 1½ grains. Make a pill, on hot plate if necessary.

Lithium and Sodium Ichthosulphol need less Liquorice.

Pessaries of Ichthosulphol, 10% strength, with Cacao butter basis are used for leucorrhœa, and 2 to 5% in gonorrhœa of the female. Also made with **Resorcin,** 3%. These must be made with Cacao Butter basis. *See also* **Ovules.**

Suppositories of Ichthosulphol may contain 3 grains (0·2 Gm.) with a basis of Theobroma 12 grains. The mixture must be almost 'set' whilst pouring into the moulds, otherwise may separate. The addition of beeswax is not desirable; indeed a large proportion will render the suppository quite insoluble. May also be made *if for immediate use,* with **Glyco-gelatin basis.** Do not overheat the mass, or it may become insoluble. (*Physicians should specify which basis they prefer.*)

The following proportions stated to be satisfactory. Ichthyol 10, Glycerin 60, Gelatin 16, Water 14. The Gelatin is soaked in the water overnight first. —George Roe, C.D., July 2, '27, p. 49.

Tampons, Glycerin-Ichthosulphol 5, 10 and 20% *v.* Glycerin.

Unguentum Ichthosulphol may be made to contain from 20 to 50% with lanolin or with olive oil and lard. For psoriasis and erysipelas and blepharitis (5%). May be perfumed with otto of rose *q.s.*

Ichthosulphol Resorcin, contains Resorcin 10% for external use.

Ichthosulphol Paste for acne rosacea. Ichthosulphol 25, Carbolic Acid 2½. Dissolve in Warm Water 22½, and mix with Starch 50. Painted on the skin, quickly dries and is easily washed off.

Pasta Ichthosulphol et Olei Terebinthinæ.

Ichthosulphol 1, Oil of Turpentine 1, mix. Of value in chilblains.

Unguentum Ichthyol et Zinci Oxidi, R.O.H.

Ichthyol 4 grains, Zinc Oxide 4 grains, Soft Paraffin to 1 ounce.

Ichthosulphol Proteinate. ✱**Ichthalbin** (T.M. 223215).

Dose.—¾ to 15 grains (**0·05 to 1 Gm.**).

A combination of ichthosulphol and albumen; an odourless and tasteless brown powder. Used internally for eczema, nervous intestinal affections and during convalescence from fevers.

Ichthosulphol Salicyl is a powder made with either 25, 33⅓ or 50% of sodium salicylate for psoriasis, acne rosacea and for rheumatic pains, and has been given internally in pills for tuberculosis.

***Ichthoform** (T.M. 222252, Class 2, and 222253, Class 3).
PATENT 9157/1899 lapsed in 1907.
A compound of Ichthosulphol and Formaldehyde, insoluble in water Intestinal Antiseptic, *e.g.*, in tubercular diseases. *Dose.*—1½ to 5 grain. **(0·1 to 0·3 Gm.).**

***Thigenol** (T.M. 260287) is similar but a sodium salt; a 5% ointments relieves eczema. Thigenol Soap contains 10%.

***Sphagnol** (T.M. 246705).—A native tar product produced from peaty deposits. In blepharitis, eczema, piles, sores and burns. Detergent and relieves insect bites in tropical countries. **Ointment** (10%), **Medical Soap** (15%), **Toilet Soap** (5%), and Shaving Soap 5%, and **Suppositories**, 3 grain for piles, are made.

INFUSA CONCENTRATA.

These preparations are made of such strength that one volume diluted with 7 of water approximately represents the official Infusion. Farr and Wright recommended dilute Chloroform Water (Chloroform 1 in Water 1,000) either (*a*) by **Macero-Expression** in which the amount of drug required per pint is macerated in 15 ounces of the menstruum in a closed vessel for 24 hours, strained, pressed, and the alcohol or tincture necessary then added and maceration repeated two or three times. The two latter liquors are evaporated and added to the first and made up to one pint. The third maceration may be omitted when dilute alcohol is used as menstruum, and for the second maceration only *q.s.* need be used to make the expressed liquids, when mixed, measure one pint. The dilute chloroform water is to be used to prepare diluted alcohol when this is employed as menstruum. (*b*) By **Repercolation** consisting in moistening half the drug with menstruum and percolating. The other half is then moistened and percolated with the first percolate—percolation being continued in a second percolator until 13 ounces (reckoned on pint formula) are obtained. Add the alcohol and any tincture, etc., in the formula and reserve. Complete the exhaustion. The weak liquors are evaporated and added to the reserved portion. The bulk is then made up to volume (1 pint).

When using diluted alcohol as menstruum simply percolate until 1 pint of percolate has been collected from the second percolator. This is the easier procedure. By whichever process they are made concentrated infusions must, to keep, *contain at least* 20% (*for export* 25%) alcohol.—W. H. M. 1% of Formalin Solution is also used as preservative, but Alcohol is better.

An Interesting Experiment.—In Nov. 1926 we pressed the juice from some 8 lbs. of fresh watercress yielding nearly a gallon of liquor—the object being to obtain the chlorophyll, with the idea of retaining the vitamins, intact. It was not heated. Portions were preserved with Chloroform 1 in 200, Toluol 1 in 400, Glycerin 25%, Formalin 1 in 100, Benzoic Acid 1 in 400. They all remained absolutely sweet and unfermented for months.

For Watercress, see also Nasturtium.

Broom, by (*b*), but not very satisfactory. **Buchu**, by (*a*) using dilute alcohol and add tincture 1 ounce to each pint. Diluted, however, not equal to the

fresh article. **Calumba,** by (*a*) heating finally to 85° C. for 5 minutes. **Cascarilla** by (*a*) adding 6 dr. (B.P.C. 12 dr.) tincture to a pint. Diluted as good as infusion. **Chamomile** (*b*), dilute with alcohol, adding 1 drop of oil for each ounce of flowers used. **Chiretta** (*b*), satisfactory. **Clove,** not satisfactory. **Cusparia** (*a*), good. Ⓟ **Digitalis** (*a*), will not keep more than one month —B.P.C. **Gentian Compound** (*a*), adding 2 drachms of orange and lemon tinctures to the pint. **Hops** (*a*), with alcohol. Use old hops. **Orange** (*b*) adding tincture 1 ounce. **Orange Compound** (*a*), adding 1 ounce orange and lemon tinctures. **Quassia** (*b*). **Rhatany** (*a*), if with alcohol more body, but not like official article. **Rhubarb** (*b*). **Roses** (*b*), with acidulated alcohol. **Senega** (*b*), with alcohol and a little ammonia. A little wintergreen oil to be added to finished product. Deposits in time. **Senna** (*a*), with alcohol and add essence of ginger ½ ounce to pint. Diluted is as good as the fresh infusion. **Serpentary** (*b*). **Valerian** (*b*), with addition of ammonia (B.P.C. uses 0·3% strong solution). **Infusum Cinchonæ Acidum** (*B.P.* '14). Cannot be produced in a concentrated form.

These remarks apply equally to the *B.P.* '14 Infusions, but Cusparia, Hops and Serpentary are now omitted.

P. Off.—Many infusions may be prepared by maceration with 25% Alcohol.

Infusum Quassiæ Concentratum (as injection for threadworms in children) should contain no alcohol.—B.M.J. ii./11,52.

Tisanes.—Infusions or teas (usual strength 1 in 10) of herbs are largely used by the laity in France, Italy, etc. Those mostly in use are :—*Tilleul* from flowers of *Tilia Europea*—Linné. German—*Lindenbluthen* (anti-spasmodic diaphoretic) ; Senna and Manna (largely used) ; *Queues de Cerise*, cherry-stalk diaphoretic ; Peppermint ; Tamarinds ; *Bourrache*, Borage-leaf tea ; Chamomile ; *Mauve* :—Malva Sylvestris, Marshmallow-flowers (demulcent) ; *Chiendent* couch-grass (kidney-tonic) ; Aniseed (both varieties), Linseed ; *Orge* (pearl barley). A large number of other tisanes are prepared—Ph. Notes, France and Riviera. Several are contained in the Fr. Cx.

They form the basis of domestic therapeutics in France—virtually unknown here.—B.M.J. i./21,60.

IODOFORMUM.

Tri-iodomethane. CHI_3=393·7938.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**).

Manufacture.—By acting upon Alcohol with Iodine in the presence of Caustic Potash (or Carbonate) solution at about 70° C.

$$(6KOH + 4I_2 + C_2H_5OH = CHI_3 + HCOOK + 5H_2O + 5KI).$$

It is also produced by the electrolysis of an aqueous solution of Potassium Carbonate, Potassium Iodide and Alcohol.

The substance has characteristic odour and contains 96·7% Iodine.

A precipitated form is also available. M.pt. 119° C.

Antidotes.—Opiates, bromides, diuretics with 5 to 10% of Sodium Bicarbonate locally.

Internally we have known it to be badly tolerated—may bring out a rash or crop of angry spots.

Soluble 1 in 8 of absolute ether, 1 in 10 of ether (Sp. Gr. 0·735), 1 in 12 of chloroform, 1 in 95 of 90% alcohol, 1 in 14 of eucalyptus oil, 1 in 10 of collodion, 1 in 60 of vaseline and oil of almonds, and about 1 in 30 of olive oil. Almost insoluble in water, but dissolves 1 in 10 of Rubini's solution of Camphor, which disguises its odour.

Incompatible with calomel, silver and other nitrates, potassium chlorate, nitrites and methylated spirit.

Iodoformum Aromaticum is scented with Coumarin, 1 in 50.

To cover its odour it may also be mixed with Menthol, Phenol, Thymol, Oils of Anise, Eucalyptus, Geranium, Peppermint, Rosemary or Sassafras, about 1 or 2%.

To remove the smell from the hands, utensils, etc., rub with a little crushed linseed and wash afterwards.

Uses.—Antiseptic, anæsthetic and sedative. Useful in gonorrhœa and syphilis (non-irritant). For sores as dusting powder or ethereal solution. Insufflations (*q.v.*) are used in throat affections. The (10%) ointment is a useful dressing to wounds.

Taken internally, Iodoform decomposes, and iodine is soon found in the urine; being non-irritant has given good results in intestinal hæmorrhage, tertiary syphilis and cirrhosis of the liver, also to kill tapeworm. Tuberculous peritonitis has rapidly recovered under Mercury and Chalk ½ grain with Iodoform ½ grain thrice daily. Excessive administration may produce symptoms like those of exophthalmic goitre in susceptible persons.

LEPROUS ULCERS. Well treated by application of 16 grains to an ounce of Acetone for small ulcers and 10% Iodoform in Eucalyptus Oil for large and sloughing ones.—M. C. Lang, I.M.G., May '30, per M.A. '31,278.

Iodoform Oil (20 grains to 1 ounce of Olive Oil) is useful as dressing in early stages in recovery after operation for fistula—the oil facilitating packing with dressing.—The first few dressings in these cases are usually painful

Oleum Iodoformi et Creosoti. *Syn.* HUILE CREOSOTÉE IODOFORMÉE.

Heat Olive Oil 70, to 120° C. for 10 minutes. When cold add Creosote 5, Guaiacol 1, and Iodoform 10, lastly Ether 30.

Collodium cum Iodoformo.

Iodoform 1, Flexible Collodion 12. P. Jap. and FR. CX. 1 in 10. Acetone Collodion will dissolve 5%. A pigment to venereal sores.

Emulsio Iodoformi. *For injection into sinuses.*

Iodoform, in fine powder, 1 (Alcohol 90% *q.s.* to moisten. St. Barts., G.H.), Glycerin 7, Boiled Water 2. Mix well in above order.

Lister used simply 1 in 10 of glycerin as in L.H. In **Glycerinum Iodoformi, K.C.H.** (1 in 10) the Iodoform is washed with 1 in 20 Phenol. Most effective before caseation has occurred. For filling a cavity in the bone, after removing caseating tissue, Iodoform 1 and Boric Acid 4 is useful.

Injectio Iodoformi. *For Bladder Injection.*

Iodoform, in fine powder, 1, Mucilage of Tragacanth 2, Water 7, This is less irritating than the Glycerin Emulsion (should be diluted 20—40 times with warm water).

Gauze, Gauze Bandages, Wool, and Lint contain 5%, 10% and 20%, British made contain correct quantity —G. Lenthal Cheatle.

Gossypium Iodoformi. P. Jap. IV. directs to dissolve Iodoform 1 in Liquid Paraffin 1 and Ether 18, soak cotton wool 18 in same, press gently until of uniform colour and dry.

Insufflatio Iodoformi.

Iodoform 2, Starch (carefully dried) 1. In specific affections of the throat, antiseptic and mildly caustic.

℞ Insufflatio Iodoformi Composita.
Iodoform 6, Boric Acid 6, Morphine Acetate 1.

Iodoform and Eucalyptus Bougies. **Cereoli Iodoformi et Eucalypti**
Iodoform precipitated, 5 grains. Eucalyptus Oil 10 minims Theobroma Oil 35 grains. To make a bougie 4 inches long. Used for acute gonorrhœa. When the symptoms have subsided, any remaining discharge may be treated by Zinc Sulphate injections.

Iodoform Varnish (Whitehead's).
Benzoin 4, Storax 3, Balsam of Tolu 1, Purified Ether 40 ; dissolve, strain, and add Iodoform 4. For surgical application.

Pigmentum Iodoformi, Gt. Orm. H. *Whitehead's Varnish modified.*
Iodoform 1 drachm, Benzoin Varnish 10 drachms. (**Benzoin Varnish** is : Benzoin 4 drachms, Resin 3 drachms, Balsam Tolu 1 drachm, Ether 0·720 ounces.)

Cheap and effective : does not retract the skin, dries well, and remains elastic. Clean, antiseptic, and mildly stimulating.—J. W. Peck, B.M.J. ii./31,681.

Mencière's Solution 'A.' For embalmment of wounds. Iodoform 10, Peruvian Balsam 30, Guaiacol 10, Eucalyptol 10, Ether 100.

Changes the aspect of wounds, often of the most septic. Previous successive lavage with three antiseptics : Sublimate 1 in 1000, Carbolic 1 in 40, Hydrogen Peroxide 1 in 3. All germs and spores whether anaerobic or aerobic are not equally sensitive to the three.

This solution employed to soak wicks of gauze or injected into sinuses. His 'B' solution also used : differs from 'A' in the quantity of ether, which is 1000 instead of 100. May be used instead of or in absence of Hydrogen Peroxide. Powerful antiseptics but sparing cells—in contradistinction to Iodine which causes necrosis of cells and leaves a surface which is an excellent culture medium for bacteria.—L. i./15,269, see also F. C. Madden, use among Turkish wounded, i./16,614.

Pasta Iodoformi, R.D.H.
Iodoform 6, Tannic Acid 1, Liquefied Carbolic Acid *q.s.*

Cinnamon Paste (**Iodoform Paste**) is used by Dentists and understood to mean Iodoform Powder mixed into a paste with Cinnamon Oil. Used for treating septic root canals.

Pencils of Iodoform, the thickness of a No. 9 catheter, for uterine medication, are prepared with Iodoform 15%

Pigmentum Iodoformi. *See* **Collodium cum Iodoformo** *antea.*

Suppositories contain 1, 3 or 5 grains in each with Oil of Theobroma *q.s.* For fissure of the anus and irritating hæmorrhoids.

Unguentum Iodoformi *B.P.* '14 is 1 in 10 Prepared Lard. The formula unsatisfactory. Iodine is liberated and it turns a dark colour. Potassium Carbonate 1% added prevents this. R. O. H. has 60 grains to 1 ounce Soft Paraffin.

Unguentum Iodoformi cum Eucalypto. R.O.H. Iodoform 8 grains, Eucalyptus Oil 72 grains (*sic*), Hard Paraffin 160 grains, Soft Paraffin to 1 ounce For ozœna.

Petrolatum Iodoformi (10%). A useful surgical dressing to wounds.

Pasta Moorhofi, R.V.I.
Mix Iodoform 60, Cetaceum 40, Sesame Oil 40, and add 5% of a mixture of Carbolic Acid and Camphor, equal parts.

Collapsible Tubes (with Catheter attachment) of **Iodoform and Eucalyptus Ointment** of each 5%, and of **Iodoform 5% and ℞ Cocaine 2% Ointment are useful for gonorrhœa.**

Iodoform Substitutes.

Thymol Iodide, U.S. *Syn.* **Aristol.** DI-THYMOL-IODIDE.
FR. CX. $[C_6H_2(CH_3)(C_3H_7)OI]_2 = 550{\cdot}0512$.
ARISTOL: T.M. No. 93538, 322522 Associated. *Syn.* Thymol Iodide.
PATENT: 5079 of 1889. Now public property.

Manufacture.—The following formula according to our work is better than the patent.

Dissolve Thymol 1·5 and Sodium Hydrate 1·6 in Water 50; into this pour with constant stirring a solution of Iodine 6 (probably 4 sufficient), Potassium Iodide 8, in water 50. Yield is about 2·9 from these quantities.

The name "Iodo-Thymol Iodide" given in the patent does not convey any correct impression. Our analyses indicate a body of the composition Di-Thymol di-Iodide.

A brown powder containing about 45% Iodine; must not be heated above 100° F. nor exposed to light. *Soluble* in Alcohol and Oils, insoluble in Water.

Incompatible with alkalis, Mercuric Chloride, Metallic Oxides or anything decomposing Iodides.

Used for psoriasis, lupus. eczema, and for ozæna; as dusting powder alone or diluted 5 to 50%. Ointments 2 to 10% and Pastes also employed. For blepharitis and conjunctivitis 10% in sterile Sesame Oil Solution is suggested, also for burns and ulcerations.

For skin ulcers with equal weight of dried Ferrous Sulphate. **Suppositoria** (Theobroma basis), 1 grain in 15 grains for hæmorrhoids.

'Collapsubes' of Aristol Ointment 10% for venereal diseases of the urethra.

Formamin-Ethyl-Iodidum. $(CH_2)_8N_4C_2H_5I = 296{\cdot}0966$.

A combination of Hexamine and Ethyl Iodide. The author has prepared this compound, but it is not suitable for internal use. Physiological tests showed that injections of the substance caused cirrhosis of the liver in a guinea-pig. Locally may be useful as an antiseptic.

Formidin. (Capsules contain 5 grains.)

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**)

Stated to be a compound of Salicylic Acid, Formaldehyde and Iodine $C_{29}H_{15}O_8I_5$, containing approx. 50% Iodine.

A white powder insoluble in water, alcohol and dilute acids.

It decomposes in the presence of alkali, hence used as intestinal antiseptic. Applied locally in skin affections. Its action is said to be due to the splitting off of salicylic acid, formalin and iodine.

Iodol.—*Syn.* TETRA-IODO-PYRROL. $C_4I_4NH = 570{\cdot}7438$.

GERMAN PATENT (35,130/1885) expired. *Not a Trade Mark.*

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Brownish powder containing 89% iodine, obtained by acting on pyrrol with iodine in presence of alcohol. It explodes if rubbed with mercuric oxide. Decomposes at 140° C.

Soluble 1 in 145 of glycerin, 1 in 6 of absolute alcohol, 1 in 21 of 90% alcohol, freely in ether; also in chloroform and oils. Insoluble in water.

Uses.—Painless wound dressing for buboes, ulcers, and ear discharges.

An ointment, 1 to 5 of Vaseline, and a solution, 3 parts to 35 of alcohol and 62 of glycerin, have been used for granular and chronic conjunctivitis with good results; and a solution of Iodol 1, Alcohol 3, Glycerin 21, as a pigment in diphtheria. Also Iodol 2, Menthol 1, Almond Oil 96, for throat spray or pigment.

1% of menthol covers odour of Iodol, and is said to render it more active.

'Collapsubes' with catheter attachment of Iodol ointment 5, with Eucalyptus oil 10% with soft Petroleum basis are made for treatment of gonorrhœa.

IODUM.

I=126·932.

For Manufacture of Iodine from Caliche (Crude Sodium Nitrate Peru), *and data on the Kelp Industry and the History of Iodine, s* Vol. II. *q.v., also for data as to Iodine being eaten out of the soil in t* Argentine and elsewhere. *Iodine in Foods, Waters, etc., is also dea* with.

Iodine as a by-product in the superphosphate industry.—P.J. i./31,38

Irish Free State Scheme for marketing Kelp. About £7 per ton pai Iodine factory at New Docks, Galway.—P.J. ii./30,493.

In the Great War, Iodine was largely used in the manufacture of poisc gases and lethal shells.

The following medicinal inorganic iodides contain the haloge approximately in these proportions: —Ammonium Iodide (NH_4- 87·5%, Lithium Iodide (Anhydrous) (LiI), 94·75%, Potassium Iodic (KI) 76·4%, Rubidium Iodide (Rb I) 59·75%, Sodium Iodide (Na 84·6%. Strontium Iodide ($Sr I_2 + 6 H_2O$) 56·45%.

Soluble.—In Water, 1 in 5,000, readily in Alcohol 90%, Ether in 4, Chloroform 1 in 30 about, slightly in Glycerin. Very solubl in Potassium Iodide Solution.

For Iodine Assay and the 'Iodine Number' of Fats, etc., see Vol. I

Antidotes.—Stomach pump, Emetics (Apomorphine Injection Starch, Saccharated Solution of Lime, demulcents and stimulants finally, Opiates.

Sodium Hyposulphite would be best chemically. Sodium Tetrathionat is formed which is stated to be non-toxic. A 10% solution will combin (decolorise) ½ its weight of Tinctura Iodi Fortis *B.P.* '14. Let the patien sip a solution during intervals of vomiting.

Skin rash due to Iodine may resemble variola.

Incompatible with alkalis, alkaloids, starch, soluble lead an mercury salts, carbolic acid, chloral hydrate and sodium thiosulphate

Uses.—Internally is variously used as Tincture *q.v.* in influenza catarrhs, epilepsy, and to reduce obesity. Typhoid has been wel treated with it combined with a little Phenol as a drink.—*Vid* Tincture.

Externally.—Irritates the skin, if too strong will blister A counter-irritant painted on chilblains, over inflamed joints, spots o pleurisy, sore gums and scrofulous glands, to abort boils, and is in jected as tincture to cure hydrocele, *cf.* also Morton's Fluid for spina bifida. For ringworm (*cf.* Coster's Paste). Is inhaled to check profuse expectoration in chronic bronchitis.

Iodine is a powerful germicide. A 1% solution has been stated to be equal to Mercuric Chloride 0·5%. *Cf.* **Skin Sterilisation** *posted* and Chapter on Antiseptic Powers, *Vol II.*

Catgut (*q.v.*) is sterilised by immersion in 1% alcoholic solution.

Burns are well treated by a 2% alcoholic solution of Iodine.

In puerperal sepsis as a douche—*vide* **Injectio Iodi.**—C. H. W.

References to literature. See p. 509.

Intravenous Iodine Injection.

The following have been used: Iodine 1 drachm, Potassium Iodide 1 drachm, Distilled Water 5 ounces, 2 drachms. *Dose* (adult).—3 to 6 minims intravenously.—J. C. Chaudhuri, I.M.G., Feb. '25,90. It would be better ***diluted*** as *e.g.*, in the following:

PNEUMONIA and cellulitus have been treated with initial dose of Tincture 20 minims (1·2 Cc.) in 10 Cc. of Normal Saline, increased by 10 or 20 minims, according to reaction, up to 60 minims.—A. B. de Castro, I.M.G., Mar.'25,141. See also S. N. Datta, I.M.G., Dec. '25,579. *See also* Jl. Trop. Med. Sept. 1, '27,225.

Pneumonia, erysipelas, cellulitis, rheumatism, septic wounds and bad cases of phagedaenic ulcers well treated. Iodine 24 grains, Potassium Iodide 36 grains, Distilled Water to 1 ounce. *Dose*, 1 to 2 Cc., diluted with 8 Cc. distilled water and given once or twice weekly.—E. Burke, B.M.J. ii./27,1062.

EYE AFFECTIONS.

For papillitis, retinitis pigmentosa, optic atrophy, or optic neuritis, treat root cause, give Iodine intravenously (½ grain each Iodine and Potassium Iodide in 10 Cc. Distilled Water) every 3 or 4 days up to 6 injections, rub Mercurial Ointment into the temples daily and deep Cyanide injections (½ to 1 Cc. Cyanide of Mercury 1 in 2000 with Novocain). Marked progress with this treatment, a notable feature being the rapidly improved vision after Iodine injections. Where there are no prominent veins, the following is given intramuscularly—Sodium Iodide 250 grains, Iodine 200 grains, Ac. Carbol. Liq. 3 drachms, Distilled Water 4000 Cc. 10 Cc. injected into gluteal muscles every 6 or 8 days. The mixture should not be stirred up.—E. R. Shetti, B.M.J. ii./30,1098.

KALA-AZAR treated by a solution containing Iodine and Potassium Iodide, of each 6 grains, Distilled Water to 1 ounce, approx. 1 grain in 80 minims (5 Cc.) —I.M.G., July '23,312.

MALARIA and a variety of other diseases have been treated.

Ⓟ Chloroformum Iodi, 1 in 30.

Stains less and does not promote desquamation, itching or dermatitis like alcoholic solution.

Glycerinum Iodi.

Iodine 1, Glycerin 50. Heat carefully till dissolved. A useful pigment, the skin does not harden by repeated application, nor peel off. Water helps solution, *cf.* Morton's Fluid.

For ***internal use*** this preparation is quite suitable diluted with water with which it mixes temporarily. *Dose.*—On lines of the Tinctura Iodi Fr. Cx. (Bird's 'intensive') method of use. It is approx. ⅕ the strength.

Glycerinum Iodi, C.X., is Morton's Fluid, *sine Aqua.*

Injectio Iodi Hypodermica Fortissima.

Iodine 360 grains, Potassium Iodide 360 grains, Distilled Water 4½ drachms. Should measure exactly 1 ounce and contain ¾ grain free Iodine in each minim. *Dose.*—3 to 5 minims for fibrous bronchocele.

A grain of Iodine may be held in solution in a minim of fluid, by employing Sodium Iodide in the proportion of Iodine 3, Sodium Iodide 2, and Water *q.s.* to 3 volumes.

Iodo-Glycerin Solution. **Injectio Iodi, C.L.T.E.** *Morton's Fluid.* *Distinguish from Douche which is also called 'Injection.'* Iodine 10 grains, Potassium Iodide 30 grains, Water 25 minims, dissolve, add Glycerin to 1 ounce. In spina bifida about 30 minims have been injected into the tumour, also injected into solid goitre.

Injectio Iodi, C.H.W., L.H. IODINE DOUCHE.—Weak Tincture of Iodine 2 drachms, Water 1 quart. For injection in puerperal sepsis.

Gangrene of the vulva, vagina and cervix has been treated by a

douche of normal saline, cutting away the gangrenous parts, the giving a weak iodine douche, followed by packing with Balsam of Pe gauze.

Indiscriminate douching by women a great mistake.—W. E. Fothergi B.M.J. i./18,445.

Endometritis treated by swabbing and irrigation with a mixture of solutio of Iodine (1 in 10) 1 part and Glycerin 7.—R. Hobbs, B.M.J. ii./21,35.

Iodum Oleatum. (*Not for internal use.*)

An Iodine-Oleic Acid compound containing 10% of Iodine. Whe thoroughly rubbed into any part does not stain the skin, but is rapidl absorbed. Suitable for inflamed joints, enlarged scrofulous gland skin affections, sciatica, sprains, chilblains; should prove of value i tinnitus aurium.

Liquor Iodi (*B.P.* 1885).—*Syn.* LUGOL'S SOLUTION.

Iodine 2, Potassium Iodide 3 (U.C.H. has 2), Water 40.

Liquor Iodi Compositus, U.S. Iodine 5, Potassium Iodide 1(Water to 100.

Mistura Iodi Composita E.L.—Tincture of Iodine 1 minim, Glyceri of Carbolic Acid 1 minim, Caraway Water to 1 drachm.

℞ **Pigmentum Iodi et Aconiti.** *Syn.* TINCTURA IODI ET ACONIT Weak Tincture of Iodine 1, Tincture of Aconite (Fleming's) 1.

Periodontitis is relieved by Iodine, or Iodine and Aconite Pigment

Pigmentum Iodi Æthereale.

Iodine ½, Alcohol 90% 3, Methylated Ether 2½. This dries rapidly

Pigmentum Iodi et Ætheris Acetici (*J. Dundas Grant.*)

Iodine 5 grains, Acetic Ether 2 drachms, Glycerin to 1 ounce (dis pensed in a 2 ounce bottle, so as to allow of brisk shaking before appli cation). For the tonsils.

Pigmentum Iodi cum Liquore Formaldehydi. Mid. H. 1927.

Weak Tincture of Iodine 13⅓, Formaldehyde Solution 1, Glycerin to 100.

Pigmentum Iodi et Olei Picis. *Syn.* PASTA IODI ET PICIS, COSTER'S PASTE.

Mix Iodine 1, Light Oil of Wood Tar 4, carefully, applying heat i necessary. Ebullition occurs and a part of the oil is oxidised and forms a resinous deposit.

Uses.—For ringworm of the scalp; after well shaking the bottle it should be well brushed in with a stiff brush; a scab will be produced which should be removed in a few days, the part cleansed by soaking with oil, and then soap and warm water; after drying, more paste should be applied. It seldom causes pain.

Iodine, Choral Hydrate and Carbolic Acid, equal parts, have also been recommended for ringworm.

Pigmentum Mandl, T.H.

Iodine 6 grains, Potassium Iodide 20 grains, Oil of Peppermint 5 minims, Glycerin to 1 ounce. Used as a throat stimulant.

Syrupus Iodo-Tannicus (Martindale).

Dose.—½ to 2 drachms (2 to 8 Cc.), containing ⅖ to 2½ grains of Iodine, in water or wine.

℞ Iodine 2, Tannic Acid 2, Glycerin 20, Water 30, Syrup (with flavourings and carminatives) *q.s.* to 100.

Combine the Iodine and the Tannin in presence of the water, glycerin and syrup *q.s.* until no indication of free Iodine with starch, cool and add the other ingredients. This contains the Iodine to a great extent in the form of Hydriodic Acid.

The Fr. Cx., P. Ital.V., F.E. VIII., P. Belg. IV. and Ph. Ned. V. Syrup is only $\frac{1}{10}$ this strength, viz. 0·2% Iodine.

Uses.—Of great value for enlarged glands in children and also as a tonic after removal of tonsils and adenoids. Suggested in lymphæmia, anæmia, dysmenorrhœa and pulmonary affections.

Specially useful in cases of chronic lymphadenitis associated with or independent of adenoids. In atrophic rhinitis has given good results especially when combined with arsenic, and in simple bronchocele supplement by the external use of Iodine Oleate or **Unguentum Iodi Intinctum** (*q.v.*). In arteriosclerosis it is often more valuable than Iodides or Thyroid preparations.

Syrupus Tann-Iodo-Phosphoratus.

Dose.—½ to 2 drachms. Contains 5 grains Monobasic Calcium Phosphate in 2 drachms of the Syrupus Iodo-Tannicus—*Martindale.*

Tinctura Iodi Fortis (*B.P.* '14). *Syn.* **Liquor Iodi Fortis, Strong Solution of Iodine** (*B.P.* 1898).—Pigmentum Iodi, Linimentum Iodi (*B.P.* 1885).

This is 10% *w/v* and conforms with F.I. Its composition is Iodine 10, Potassium Iodide 6, Distilled Water 10, Alcohol 90% to 100. U.S. is 7% *w/v.*

Solutio Iodi Spirituosa, P. Belg. IV. and F. E. VIII. is Iodine 6·5 Potassium Iodide 2·5, Alcohol (90%) 91 (by wt.).

Tinctura Iodi (Mitis) (*B.P.* '14). *Dose* (for vomiting).—2 to 5 minims (**0·12 to 0·3 Cc.**).

Iodine 1, Potassium Iodide 1, Distilled Water 1; dissolve, add Alcohol (90%) *q.s.* to 40.

Should be recently prepared or is liable to contain Aldehyde and Hydriodic Acid. This aldehyde in presence of Iodine and water oxidises, forming more Hydriodic Acid as well as Acetic Acid. The Acetic Acid may become etherised forming Ethyl Acetate.—'Pharmacal Notes.'

A little Iodic Acid added to the Tincture will prevent decomposition—it breaks up Hydriodic Acid as formed.—P.J. i./14,713.

Various derivatives of Ethyl Iodide and compounds in addition to HI in Tincture of Iodine, Assay.—P.J. i./30,415.

Chloroform 1 drachm, added to 4 ounces Tincture of Iodine prepared with Industrial Spirit, inhibits its lachrymatory effects.—F. Sloman, P.J. ii./28,419.

Flavoring.—Syl Lavandulæ, Syl Vanillæ; Syrupus Aurantii.

Antidotes.—See under Iodum.

In the Great War Tincture of Iodine was an invaluable specific against tetanus in wounds. It is largely used as a First Aid Dressing, but plain 2% ***Iodine in Spirit*** is preferable *see p.* 511.

References to Iodine Therapy, p. 509.

Tinctura Iodi (***Sine Potassii Iodido***), Teinture d'Iode, Fr. Cx. 1908, P. Hung. (Sometimes called *Indian Tincture of Iodine.*)

Dose.—Max. Single (in Fr. Cx.) **0·25 Gm.** (4½ minims), Max. during 24 hours (Fr. Cx.) **1 Gm.** (18 minims.).

Usual Dose in Great Britain.—10 to 25 minims. According to

Tom Bird (see Uses and Prescribing Notes) this dose can be given thrice daily in arthritis. (Usually first week, 10 minims. *t.d.p.c.* second week, 20 minims ; third week, 30 minims.)

Composition.—Iodine 1, Alcohol 95% (by volume), 9 by WEIGHT. (In making it *by volume* use 11·03 of the alcohol instead of 9 by wt.)

Sp. Gr. of the tincture is 0·888. 1 Cc. contains 0·089 Gm. Iodine 10 minims contains 0·81 grains.

P.G.V. was similar. For P.G. VI. see p. 509.

Liquor Iodi Simplex, etc., proposals for B.P.—L. ii./30,918.

Criticism of proposed Liquor Iodi Simplex. Loss of free Iodine with acid formation. Potassium Iodide prevents these changes.—J. R. Walmsley, P.J. ii./31,71.

Uses and Prescribing Notes.

This Tincture of Iodine is given as a tonic before meals in tuberculosis, also in the commencement of " la grippe " and ordinary colds; largely used on the Continent with excellent results. In vomiting of pregnancy invaluable, and small doses in sea-sickness.

The ' intensive Iodine Treatment ' of tuberculosis was advised by L. Bourdreau. Large doses can be given by a gradual increase. He suggested that the method might be of use in other affections. Dr. Wm. Ewart, of St. George's Hospital, tried it for his own arthritis with good result. Tom Bird, L. i./20,546, records, Pres. Feb. 21,190, success in arthritic cases and chronic gout and in ' rheumatic gout.' As *much as* 10 *grains of Iodine per diem can be given.* There may be slight catarrh of the nasal mucous membrane, but no iodism as from Potassium Iodide. The Iodine is probably deposited on the stomach lining and slowly absorbed.—T. Bird.

The patient places the dose (15 *drops* equal approx. 10 minims) in a glass and adds half a tumbler of water. It may also be given in milk, forming an Iodo-Casein compound.

The following makes a clear solution :

Tincture of Iodine FR. CX. 1908.	Equal parts.
Spirit of Chloroform.	
Glycerin.	

Dose.—30 minims (**2 Cc.**) = approx. 1 grain of Iodine.

(**Glycerinum Iodi,** 1 in 50 (*v.*p.505), is miscible with water temporarily.)

It has been suggested (G. Walker, P.J. i./21,4, L. i./21,239) to use more of 90% Alcohol, as the 95% is not readily available.

It is unfortunate, as the method of using the Tincture is in considerable vogue, that the 10% *w/w* preparation is now ***superseded*** by FR. CX. SUPP. II. (1922), and the *title* of the Iodised Tincture of Iodine (Teinture d'Iode, iodurée) contained in the Supplement issued in 1920, is to be altered to Official Tincture of Iodine (**Teinture d'Iode Officinale**). This preparation is : Iodine 10 Gm., Potassium Iodide 4 Gm., Alcohol (90 per cent) 136 Gm. (It contains $\frac{1}{15}$ of its weight of iodine.)—P.J. ii./22,162 ; ii./22,609.

(The title ' **Officinale** ' is confirmed by **Fr. Cx. Supp. Nouv. 1926.**)

We advise that ***unless otherwise directed the original 10% w/w of the Fr. Cx. should be dispensed*** for 'French Tincture.'

Prescribers should order " **Tinct. Iodi 10% (sine Pot. Iod.)** " to prevent misunderstanding.

A comparison of the Tinctures of Iodine of various countries.—M. Shaw and V. Cofman, P.J. i./23,453.

Tinctura Iodi, P.G. VI. is Iodine 7 Gm., Potassium Iodide 3 Gm. dissolved in alcohol 90% 90 Gm Contains 6·8 to 7%. There is only one strength in P.G.

Tinctura Iodi Decolorata, B.P.C.

Iodine 2·85, Alcohol 90% 27·5. Dissolve with a gentle heat, and add when cold Strong Solution of Ammonia 6·25. Keep in a warm place until decolorised (it takes some days), after which dilute it with Alcohol 90% *q.s.* to 100.

A useful application for chilblains and for painting on exposed affected parts. The solution contains Ammonium Iodide and Ammonium Iodate.

Tinctura Iodi Decolorata Fortis was described in the Extra Pharmacopœia, XII. Edn. and is occasionally ordered. It is prepared as above excepting that after keeping the mixture of Iodine, Alcohol and Ammonia in a warm place until decolorised it is not diluted at the finish with Alcohol to 100.

Decolorised Iodine Tincture, Belladonna Liniment, of each 25%, Soft Soap 50%. Useful for chilblains.

Tinctura Iodi Oleosa.

Iodine 1, Alcohol (90%) 9 ; heat to dissolve, and add Castor Oil 2. Repeatedly applied does not crack the skin as the tincture does.

Unguentum Iodi (*B.P.* '14).

Iodine 1, in 25 of a Potassium Iodide, Glycerin and lard basis.

The presence of Potassium Iodide (and Glycerin) is essential to the conservation of Free Iodine in this preparation. The Free Iodine content in the *Off.* Ointment is considerably reduced after keeping for two or three months. A simple mixture of Iodine and Lard becomes rapidly attenuated in Free Iodine content—by chemical addition.

Unguentum Iodi Intinctum, Stainless Iodine Ointment.—*Martindale.*

Iodine 1, Oleic Acid 4. Heat to effect absorption and mix with Soft Paraffin 14 and Hard Paraffin 1 previously melted together.

Possesses iodising properties (*cf.* Iodum Oleatum, the liquid equivalent) for use in rheumatic affections, enlarged glands, sprains, and syphilitic conditions.

✱**Iodex** (T.M. 322589).—A stainless Iodine Ointment (containing 5%, together with a small proportion of free Iodine) to be rubbed on to the part or applied and covered with oiled silk and cotton wool. Also made with **Methyl Salicylate. Suppositories** are made containing ⅛ grain Free Iodine in a neutral base.

Ung. Iodermiol. A preparation containing about 5% of Iodine which does not harden or discolour the skin. For enlarged glands, rheumatic affections, lumbago, etc. Also made with **Methyl Salicylate.**

℗**Vapor Iodi Ætherealis.**

Iodine 3 grains, Ether 2 drachms, Carbolic Acid 2 drachms, Creosote 1 drachm, Alcohol 90% 3 drachms. Ten minims to be used in an inhaler, *e.g.*, the ' Ozonic.' Thymol may be substituted for creosote.

References to Iodine Therapy.

(For intravenous use, see p. 505).

ANTHRAX. Small amounts of Iodine in solution have been injected.

BERI-BERI well treated with Tincture of Iodine, 5 drops in a tumbler of water daily.—H. W. Ridley, Jl. Trop. Med., Mar. 2, '25,103.

COLDS. Iodine 8 or 10 drops of 1% solution, twice daily, fasting, is specific. —Per Pres., Jan., '23,14.

CORNEAL ULCERS treated by a 1 : 20 or 1 : 30 Tincture of Iodine after preliminary use of Cocaine. The Iodine is taken up on a probe or glass rod and held in the air a minute or two for the Alcohol to evaporate, then the ulcer

touched with it. The Iodine is therefore almost solid and cannot diffuse. Pres., Sept., '20,310,311. *See also Eye Affections*, under *Intravenous Iodantea.*

CYSTITIS treated by douche of 0·2% Tincture of Iodine. Non-irritati and efficient.—H. Lyon Smith, L. i./15,345.

DEBILITY and MALNUTRITION cases among children do remarkably well Iodine (usually Iodised sweets or Collosol Iodine).—K. Fraser, 1925.

A wonderful tonic for children, expecially those of tuberculous tendenci 2 minim doses of weak Tincture thrice daily in peppermint water. Improv appetite and imparts vigour.—H. E. Waller. Pres., April, 1917.

DIARRHŒA. Tincture of Iodine, 5 drops twice daily for adults and 2 dro twice daily for children, of value in acute diarrhœa or chronic colitis, ar in apparent bacillary dysentery, pending bacteriological report. Must not used in connection with other anti-dysenteric or anti-diarrhœic medication.-F. C. de Mendoca, Jl. A.M.A. ii./29,1904.

ENDOMETRITIS treated by **Churchill's Iodine Tincture** (dissolve Iodine 1,2 grains and Potassium Iodide ½ ounce in Water 4 ounces, then add Alcohol 90 to 16 ounces) applied subsequently twice a month for three months to t endometrium apparently diminishes the number of relapses following curettin —B.M.J. ii./09,1030,1204.

ERYSIPELAS has been treated by small doses injected.

EXOPHTHALMIC GOITRE treated with 30 m. of the 10% Alcoholic Solutio of Iodine a day, increased in some cases to 60 m. or more.—F. R. Frase L. i./26,551.

30 drops of Lugol's Solution daily for 3 days, and 40 or 50 drops for one two days. Hospitalisation is reduced to 5 days. Following operation Lugol's Solution is given by the mouth and by proctoclysis to combat hype thyroidism.—A. S. Jackson, L. i./25,759,825; see also J. W. McNe L. i./26,551.

Maximum improvement after 2 to 6 weeks' treatment, when most case relapse slowly and a low grade hyperthyroidism persists. Weight increased an B.M.R. reduced to normal limits in 1 to 6 weeks, when it rises slowly again 5—10 minims three times daily for first few weeks and 5 minims may b continued in some cases for 6 months, reducing dose on increase of symptoms Dangerous with abnormally firm thyroid, exceptionally severe nervous symp toms, or loss of weight in first few weeks' treatment.—L. B. Cole, L. i./27,81

A little solid Iodine, say, 2 drachms should be placed in the dormitory in a open cup for youths up to the age of puberty as they frequently suffer from defective action of the thyroid, but usually additional small doses of Iodin are requisite.—Sir James Barr, B.M.J. ii./27,470.

New views on treatment of hyperthyroidism with Iodine. Cases of thyro toxic adenoma found in Belgium to react in the same manner to Iodine as tru exophthalmic goitre. Fractioning of the dose found efficacious.—L. Dautrebande L. i./29,869; see also T. P. Dunhill, *ibid*, 949.

LUPUS and PHTHISIS and LARYNGEAL TUBERCULOSIS have been treated by evolving ***nascent Iodine in the system.*** Potassium Iodide 1 grains at 7 a.m. 2 hours later, 1 oz. Chlorine Water in ½ pint lemonade. Late increased. Benefit in a week.—J. G. Mackereth, N.Z. Med. Jl., Feb., 31, P.J i./31,569. Further references: Edn. xix. p. 517.

MERCURIAL STOMATITIS. Iodine mouth-wash (½ drachm of the tincture to a ounce of water) useful.—Yeo.

OTORRHŒA, CHRONIC. **Iodine Powder.** Prepared by grinding up Iodine crystals with Boric Acid to make a 1% preparation. Valuable in. After cleansing the meatus, filling with Absolute Alcohol for 10 minutes and drying, fill completely with the powder by insufflation, and repeat insufflation weekly until the ear heals.—N. Asherson, L. ii./31,630.

RHEUMATOID ARTHRITIS treatment. Iodine. Artificial pyrexia.—A. H. Douthwaite, L. i./31,785.

SMALLPOX and CHICKEN POX.—Iodine applied prevents pitting and aerial dissemination.

TONSILS. Diseases of, due to fungi well treated by application of dilute Tincture of Iodine and large doses of Potassium Iodide—as much as 30 grains thrice daily.—Sir A. Castellani, Pr. Jan. '30,67.

TUBERCULOUS ULCERS and others treated by Sodium Iodide internally, 15 grains three times a day with Hydrogen Peroxide and a little Acetic Acid locally on Cotton Wool.—S. A. Pfannenstill, B.M.J. i./25,732.

It is generally agreed that patients with systemic disturbance, especially febrile cases, improve rapidly. The administration of minute amounts of Iodine (1/10 or 1/5 grain every 5 days in butter-scotch) was found to give great improvement in pretubercular children when Cod Liver Oil, etc., had failed. Chronic bronchitis and allied conditions also respond well.—K. Fraser, Cumberland, School M.O. Report, 1925.

TYPHOID.—A mixture of equal parts of **Tincture of Iodine and Pure Carbolic Acid**—two or three drops in a tumbler of water by the patient's bedside, and renewed as required. Fever cut short.—David Walsh, L. i./13,1346.

VARICOSE VEINS treated by injecting 1% solution of Iodine made with Potassium Iodide (Schiassi's Method).—L. ii./22,1288.

VOMITING due to utero-gestation treated by Tincture of Iodine 5 to 10 drops with Syrup and Water.—Yeo.

Sterilisation of the skin of operation areas.

The **Weak Tincture** (*B.P.* '14) is adequate, preferably made with 70% spirit (*vide infra*) but the 10% solution (Tinct. Iodi Fortis) in 90% Alcohol has often been used, it may however produce acute dermatitis. The method was advocated by Lionel Stretton—*vide* B.M.J. i./12,522, but it had its origin in pre-Listerian days. It no doubt increases leucocytosis in the area operated upon. The skin should be dry before applying.

Iodine Sterules encased in rayon and cotton wool. The "Sterule" is snapped and the Iodine Solution is absorbed by the material, which is then dabbed on to the part as a **First-Aid Dressing** to abrasions, cuts, etc.

As application to abrasions, cuts, scratches, etc., **Weak Iodine Tincture** (*B.P.* '14) 2 parts, with Ether 3 parts, is used.—B.M.J. ii./10,974.

Rusty nail wounds and the like are well treated by packing the cavity with gauze soaked in Tincture of Iodine and allowing it to remain in for two or three days. If sutures are required, the skin along the edges should be painted to prevent stitch abscesses.—L. ii./11,238.

The Iodine produces hyperæmia, which is the real agent in producing asepsis. The increased supply of blood is not only in the skin itself, but also in the subcutaneous tissue.—L. ii./11,442.

Tincture of Iodine made with 70% Alcohol sterilised non-spore bearing organisms in seven minutes whilst if of Official strength 10½ minutes; Sublimate Spirit (1 in 1,000), however, sterilised in 2½ minutes. Aqueous solution of Perchloride 1 in 1,000 never sterilised in under 30 minutes (!). Experiments on the skin were also conducted, amongst the conclusions being that Iodine-Alcohol (the Alcohol being 70%) is more potent than Alcohol alone, but the Sublimate Spirit is better. Neither guarantees absolute sterility.—B.M.J. ii./11,1078.

1% **in Benzene** satisfactory,—experience in the Balkan Wars.—L. i./14,76.

J. L. Stretton found no reason to alter composition of the solution. Preliminary washing and scrubbing unnecessary and positively harmful. Excellent in abdominal surgery. Coils of intestine, etc., may rest on the skin which has been sterilised with it. **Grossich's Solution** (10%) is far too strong.—B.M.J. i./15,886. See also ii./15,278.

In Naval Warfare—on the 'Tiger' was largely used.—B.M.J. ii./16,598.

Gas gangrene may possibly be prevented by local use, see Gas Gangrene. Tetanus cannot be prevented by injecting Iodine—see Tetanus.

Its use is very irritating to most skins—may produce dermatitis, and the pain continues for some time after the dressing is applied. If due to *Hydriodic Acid* prevent this by adding a small amount of Iodic Acid. Good deodorant. Spirit solutions act like hypertonic salines by inducing serous flow.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

Coal Mines Regulations (First Aid) 1930, made by Board of Trade under Co Mines Act, 1911, S. R. & O. 1930, No. 91.

SECTION 8. UNDERGROUND ORGANIZATION. Dressings, etc., to be provided ar distributed by the owner.

Each person to carry a ***First-Aid Outfit*** of one large sterilised dressin one small dressing and an ampoule of ***Tincture of Iodine*** (2% ***Alcoholic***) or other Antiseptic approved by the B. of T. securely packed.

First-Aid men to keep a First-Aid box Underground containing the above, al Picric Acid 1% and a bottle of No. 1 Eye Drops.

The ***Midwife needs*** an antiseptic which can be relied on to ***ki streptococci*** on the hands quickly—within 2 or 3 minutes at most— and without previous washing. Only Iodine 0·5 to 1% and Chloramine T. 1% do this.—D. L. Colebrook, L. ii./30,369.

Fatal dermatitis following Iodine Spirit (2½% in Industrial Spiri for operation; Sodium Thiosulphate used to counteract. Pronounced idiosyn crasy no doubt.—R. C. Alexander, B.M.J. ii./30,101.

Further cases.—D. G. De Bouk, B.M.J. ii./30,162. A man applied Tinc Iodi Mit. to the arm for rheumatism. Caused a mass of blisters from head t foot. In bed 6 weeks.—L. Schapera, *ibid.* 194.

Free application to the arms caused dermatitis. Vesicles turning to pus tules. Temperature 103° F. Starch poultices used, also Sodium Bicarbonate subsequently Lin. Calcis. Alcoholic Iodine solutions are in their natur irritants. Their application to areas already denuded of surface protectio open to risk.—O. Thomas Jones, B.M.J. i./31,15.

IODIDE ERUPTION, a case of granulamatous form which is rare. Treatmen was Sodium Chloride 10 to 20 grains three times daily after meals. Said t have been attended with dramatic effect in cases of Bromide eruption. Slo recovery.—H. C. Semon. L. ii./26,803.

Iodine in Carbon Tetrachloride 1% used with success as paint prior to operation.—R. C. Alexander, B.M.J. ii./30,101.

Iodine in Isopropyl Alcohol. *Syn.* **"Propyl."** 1·25% in 70% recommended as a substitute for the commonly-used Iodine in Rectified Spirit. An efficient antiseptic. Is not harmful to the skin has penetration power and evaporation rate equal to Ethyl Alcohol and costs much less.

It should be recently prepared.—J. Wicliffe Peck, L. ii./28,444.

***Viodar** (T.M. 520931).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) of Viodar 1 in 1,000, as a stomach and intestinal antiseptic and lubricant. This is equivalent to approx. 1/20 to 1/10 grain of free Iodine.

Of Viodar 1 in 200, 5 to 10 minims (**0·3 to 0·6 Cc.**) is suggested approx. equivalent to 1/40 to 1/20 grain, carefully increased to ½ drachm (**4 Cc.**), equivalent to 1/3 grain of Iodine. The dose should be taken with water or milk.

A new oily preparation containing free Iodine, to which its violet colour is solely due. It contains no added chemical or colouring matter. It is issued in two strengths, *viz.*, 1 in 1,000 and 1 in 200, forming liquids with low Sp. Grs. (0·888 and 0·893 respectively) but high viscosity.

Both are stable at ordinary temperatures in stoppered containers, but on exposure at room temperature, or more rapidly at body heat, the Iodine contained is vaporised. A small quantity of the preparation in either strength exposed on a flat dish at room temperature rapidly liberates the Iodine, leaving the bland oil quantitatively behind.

Viodar is neutral in reaction. It does not turn acid on storage, and is in general a permanent preparation.

Viodar 1 in 1,000 is tasteless, whilst the 1 in 200 has the typical metallic taste of Iodine.

Incompatibility.—Viodar is immiscible with aqueous fluids. The preparation has the incompatibilities of Iodine compounds in general, and of oily combinations. Mercurials should not be used either *per os* or externally in conjunction with it. Caustic alkalis will remove the Iodine contained.

The preparation is however resistant to inorganic acids in dilutions which are likely to occur : hence it is not attacked by gastric acidity. The Iodine would be slowly absorbed on meeting the alkali in the subsequent portions of the digestive tract.

It is incompatible with Soft Paraffin and Lanolin, and should in preference be used without any adjuvants.

Bacteriological Investigation.—The preparation kills *B. coli*, *S. aureus*, and *S. hæmolyticus* when in contact with broth cultures of these organisms.

Uses.—**External use,** as a dressing for wounds and abraded surfaces. Gauze or wool may be impregnated with it, forming a penetrating and occlusive dressing. It may also be employed as a catheter lubricant. The 1 in 1,000 strength should prove adequate : the 1 in 200 may be too strong for mucous membranes. Skin irritation is rapidly relieved by light applications. It does not stain the skin or cause undue smarting. (The skins of some patients are intensely sensitive to Iodine in any form. The patient's response to Viodar 1 in 1,000 can be determined by applying over a small area initially.)

Internally in conditions in which an intestinal lubricant is indicated, and where Iodine is prescribed.

When Iodine is taken in spirituous solution, as in Tinct. Iodi, Fr. Cx., the Iodine is precipitated in the stomach in solid crystalline condition, incapable of being effectively assimilated. The analogous effect can be shown by adding a few drops of the Tincture to dilute Hydrochloric Acid. In the case of Tinct. Iodi Mitis, B.P., and Lugol's Solution, *B.P.* '85, it is only the presence of the Potassium Iodide that prevents a similar deposition.

With Viodar, on the other hand, the Iodine is not precipitated in the stomach : it is liberated there, *in part for use in the system, by the warmth of the body,* the rest passing into the alkaline portion of the tract for utilisation. Hence, the entire system is under Iodine treatment.

The clinical experience of patients is that they have the typical metallic Iodine taste some six to eight hours after taking full doses (1 drachm) of the 1 in 200, the effect is therefore a gradual and persistent Iodine medication.

As an Antiseptic for sputum cups, for storing ligatures, relieving gnat bites, and for pouring on the surface of water to kill mosquitoes.

The Iodine in Viodar is in a free, active, highly diffusible form differing in this respect from preparations hitherto used—hence care and discrimination are advised.

Should be valuable for both external and internal use, in the latter case the activity of the Iodides being presented in a palatable form.—L. i./31,89. See also B.M.J. i./31,589.

Inflamed and Troublesome Bursa of Foot. Immediate relief and rapid absorption of fluid.

Simple thyroid hypertrophy and perhaps also in the exophthalmic variety should be of use. It is certainly absorbed. An occasional dose helps to control the Coli bacteria in bladder infections.—W. Wyatt Wingrave, 1931.

Trench-foot was treated with the preparation during the war.

ORGANIC IODINE COMPOUNDS.

The relative rate of absorption of 'Organic' Iodine in comparison with 'Inorganic' is seen in the case of Iodoprotein, postea.

Iodinol.—*Martindale.*

Dose.—30 to 45 grains *per os* of the 25%=about 10 to 15 grains of Potassium Iodide. **Capsules** contain 30 grains (**2 Gm.**). Hypodermically 30 to 90 minims (**2 to 6 Cc.**) of the 25% preparation. (Commence with the same dose of the 10% compound.)

Sterules, Hypodermic, contain 30 (**2 Cc.**) and 60 minims (**4 Cc.**).

For treatment of tertiary syphilis larger doses slightly warmed have been given on alternate days hypodermically.

An additive compound of Iodine and Sesame Oil, in strength of 10% and 25% of Iodine, prepared by repeated iodising of Sesame Oil by means of Iodine-Monochloride. The preparation is a thick brown oil. The 25% has Sp. Gr. 1·23 and the 10% 1·025. It permits of lengthy and continuous administration of Iodine. Either the 10% or 25% preparation may be used by inunction.

Soluble in ether and in chloroform, insoluble in alcohol.

Uses.—Scrofulosis, convulsions of children, tuberculous infections, *e.g.* of the larynx, pleuritic induration, facial paralysis, arteriosclerosis, gout, bronchial troubles, actinomycosis, and syphilis have been well treated by internal and local use—in many affections either inunction or hypodermic injection can be employed. Uterine fibroids have been treated by injections. It has been found useful instilled for eye affections.

Taken *per os* it is thought to pass through the stomach into the duodenum,—here it is acted on by the bile and pancreatic secretions and is emulsified. The greater part of the iodised fat is stored in the tissues, *e.g.*, marrow, liver, etc.

Asthmatic affections are relieved by an Iodinol capsule quickly without causing headache.—Canny Ryall.

Rheumatoid arthritis relieved by hypodermic injection of a 1 in 40 solution of Iodine in sesame oil—¼ grain per week.—R. Kerry, B.M.J. i./26,976.

See also **Injectio Guaiacol Iodi et Camphoræ** (Watson Smith).

In diagnosis, Iodipin has been used by injection, but given up in favour of Bromipin which is more fluid. Warning against use in active tuberculosis of the lungs. Severe focal and general reactions may be produced.—C. Schröder, L. ii./26,1135.

It has also been used in pyelography.

Iodinol may be given in beer, wine, milk, shaken with syrup or emulsified as **Emulsio Iodinol** :—Iodinol 25% 2 ounces, Gum Acaci

1 ounce, Chloroform 12 minims, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. Dose of 2 drachms = about 12 grains potassium iodide.

Iodinol Tablets contain 3 grains of the 25% preparation, *i.e.*, ¾ grain Iodine = 1 grain Potassium Iodide. *Dose.*—Up to 90 grains (30 tablets) per diem.

Iodinol cum Extracto Malti. *Dose.*—1 ounce (**30 Cc.**).

Iodinol 25% 1, Malt Extract (thick) to 4. A palatable method of administration.

(✱**Iodatol** (T.M. 364270) is similar, made in 10, 20, and 25% strength.)

✱**Lipiodol** (T.M. 457303).

A compound of Iodine and Poppyseed Oil containing 40% by weight of Iodine or 0·54 Gm. in 1 Cc.

Dose.—For treatment 1 to 3 Cc. intramuscularly. For diagnosis 5 to 20 Cc.

Capsules 6 minims (**0·4 Cc.**). *Dose.*—Two to five with meals.

Uses.—A substitute for the alkali iodides. Employed intramuscularly in asthma, syphilis and rheumatic affections.

In conjunction with X-Rays used in the diagnosis of bronchiectasis and a variety of diagnostic procedures. It renders the bronchi and their ramifications opaque.

A 10% preparation is also used in Radiology for exploring delicate cavities.

For a full consideration of the technique, etc., and a number of references 1923 to 1927, *see* Vol. II. The following are quite recent.

BRONCHIECTIASIS diagnosed.—L. S. T. Burrell and S. Melville, L. ii./29,689.

Bronchiectasis.—Forme Hémoptöique Sèche demonstrated.—L. i./30,182.

Atelectatic bronchiectasis causes a triangular shadow at base of lung. The presence of this shadow should always raise suspicion of a bronchiectasis, unless evidence is forthcoming to clinch diagnosis of a mediastinal effusion.—A. J. Scott Pinchin and H. V. Morlock, B.M.J. i./30,12.

Chest puncture for finding fluid, new growth, thickened pleura, or solid lung. 2% Novocain used.—F. G. Chandler, L. ii./29,1084.

A soft rubber catheter used for passing through the nose into the bronchi, relatively ' agreeable ' to patients.—E. H. R. Altounyan, B.M.J. i./30,719.

Differential diagnosis *per os.*—W. Burton Wood, L. i./30,1339.

Oral injection by dropping the oil into the trachea over the back of the tongue.—L. ii./30,590.

Acute massive collapse of the lung following Lipiodol injection.—A. J. Scott Pinchin and H. V. Morlock, B.M.J. i./31,930.

A new method of injection, specially suitable for children.—E. Fletcher, B.M.J. ii./31,846. A simple technique for introduction into the lungs.—P. Franklin and A. Orley, B.M.J. ii./31,847.

Technique of intralaryngeal injection.—W. J. Fenton, L. ii./31,230.

Of 48 halogenated and unhalogenated oils and esters (including Lipiodol) injected in dogs ***Olive and Lard Oils*** and their distilled esters were found least irritating as bases for radio-opaque media. Halogenisation and esterification increases irritating properties of oils: distillation of the ester decreases them. The unhalogenated bases of some radio-opaque oils now in use are more irritating than Olive or Lard Oil.—L. A. Crandall and Co-workers, Jl. Pharm. & Exp. Therap., Mar. '31,353.

Iodine addition products of Sesame Oil—Lindblom's Method.—P. J. i./31,482.

Iodinol 40% (*see* Vol. II.) as Diagnostic Agent in chest affections is a similar preparation. The oral method is preferable. Good diagnostic pictures of the male urethra can also be obtained without irritating effect.

Iodipin *has been used on similar lines.*

Iodine-Medol contains 1% Iodine and 5% Creolin in rapidly absorbed base For chilblains, etc. Can be applied to denuded surfaces without producin escharotic effects.—L. ii./30,989.

Iodoprotein, *Martindale.—Dose.*—10 to 15 grains (**0·6 to 1 Gm** increased if desired.

A brown powder containing about 10% of Iodine.

Solubility.—The compound is insoluble in water and dilut Hydrochloric Acid; soluble, however, in dilute alkali, hence it i absorbed in the intestines, and does not derange the stomach.

Uses.—In syphilis, arteriosclerosis, gout, rheumatism, exophtha mic goitre, asthma and in all cases where Iodides are administere beneficially, *e.g.*, scrofula, enlarged glands (orchitis).

Iodoprotein Tablets 5 and 10 grains (=½ and 1 grain of Iodine).

GOITRE.—Found most efficacious—swelling reduced and genera health improved.—L. Evans.

A dose of Potassium Iodide containing Iodine 191 mgr. and a dose of Iodise Protein containing Iodine 188 mgr. were administered. The whole of th Iodine from both doses was excreted at the end of 48 hours, but the rate excretion was different. At the sixth hour 37·7% Iodine was excreted i the case of Iodised Protein, as against 51·4% in the case of Potassium Iodid In the same way the heavier salts of the halogens, such as Iodide and Bromic of Strontium yield up their Iodine and Bromine to the system at a slowe rate than the correlated salts of Ammonium, Sodium and Calcium. Excr tion may be rightly regarded as the measure of absorption, so that com paratively insoluble forms of drugs, *i.e.*, those of slower disintegration, a more likely to exert a longer continued activity.—Pres. Nov. 1911, p. 279.

Iodo-Casein.—*Dose.*—10 to 15 grains (**0·6 to 1 Gm.**).

A yellowish brown powder containing 15% Iodine. As an In organic Iodine Substitute. Insoluble in Acid, and partially dissolve in alkaline solutions.

Iodolait.

A palatable preparation containing an Iodoprotein compoun equivalent of 2 grains of Iodine to the ounce. Contains no alka Iodides and is less liable to cause iodism.

Indicated in arthritis, chronic gout, etc.

Calcii Iodobehenas U.S.X. $(C_{22}H_{42}O_2I)_2Ca = 970·5992$. ✱SAJODI (T.M. 322559). A tasteless powder containing about 23% Iodine and 4% Calcium. ***Insoluble*** in water: used in syphilis, bronchial asthma, arteric sclerosis, etc.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) up to 90 grains per diem *after* meals.

Assumed to be Iron-Iodobehenate. Contains 24·5% Iodine and 5·6% Iron Substitute for Inorganic Iodine and Iron. In syphilis, anæmia, etc.

✱**Iodostarin** (T.M. 318223). *Syn.* Di-Iodo-Taririnic Acid. $CH_3(CH_2)_{10}CI.CI(CH_2)_4COOH = 534·1156$.

Dose.—Tablets containing 3 grains—1 to 3 *per diem.*

Taririnic Acid occurs as its glyceride in the oil of the fruits of Picrami Sow or Tariri—a *Simaruba* found in Guatamala. Leaflets melting a 50·5° C. The formula given by Schmidt is $C_{18}H_{32}O_4$ not $C_{18}H_{34}O_2$ which th above compound would indicate.

Iodostarin contains 47·5% Iodine. Used in syphilis, actinomycosis an arteriosclerosis. Consumption of Alcohol simultaneously is to be restricted as iodism may result.

***Lipoiodine-Ciba** (T.M. 352122).—The Ethyl Ester of Di-Iodobrassidic Acid, containing over 40% of Iodine. Tablets contain 0·3 Gm. To be taken subsequently to the chief meals, masticating thoroughly.

For a comparison of the amount of Iodine in Organic Iodine Compounds with that in Potassium Iodide, vide Vol. II.

IPECACUANHA.

(*In numerous Pharmacopœias.*)

Dose.—As an expectorant, ½ to 2 grains (**0·03 to 0·12 Gm.**), as an emetic 15 to 30 grains (**1 to 2 Gm.**).

The dried root of *Psychotria Ipecacuanha* (*Rubiaceæ*)* from **Rio De Janeiro.** A second variety is the Minas Ipecacuanha from Brazil. A third is Indian from the same plant, grown in Straits Settlements; another variety is known in commerce as **Carthagena Ipecacuanha.** It is thicker, the annulations less marked (taking the form of narrow merging ridges) and its starch-grains are somewhat larger; this is less expensive, and is not official.

Flavoring of Liquid Ipecacuanha Preparations.—Syl Vanillæ, Syl Rosæ; Syrupus Aurantii.

Uses.—Expectorant, emetic. If taken in sufficiently large doses it is not its own antidote. Loosens phlegm, *e.g.*, in bronchitis, whooping cough and croup. In small doses is stomachic and increases the flow of bile. The alkaloid Emetine contained in it has been found to be virtually a specific for amœbic dysentery. Frequent doses, 1 to 2 minims of the Wine of Ipecacuanha sometimes check sickness.

For tropical liver abscess Ipecacuanha is specific. It cures the active or latent dysentery which has caused the suppurative hepatitis and prevents further breaking down of the liver substance. Large doses better than several small ones. Vomiting may be prevented by Chloral Hydrate and Liquor Morphinæ.

Dysentery and Hepatitis, Treatment.—The patient should not eat or drink for two hours before and after the dose, but twenty minutes previously he should take 20 grains of Chloral. The dose of Ipecacuanha is 30 *grains for the first three or four nights*, reduced to 25 and 20 gradually, a single dose daily being usually sufficient. When the temperature is normal, and the discomfort in the region of the liver has disappeared, continue for a week with 20 grains daily. Patients should abstain from alcohol in India. Diffuse hepatitis precedes a liver abscess.—B.M.J. ii./10,2039.

Diarrhœa well treated by 0·8 to 1 Gm. of the powdered root, *p.d.*, divided into 5 or 6 doses of 0·2 Gm. Each dose is taken in a warm infusion every two hours. The remedy is well tolerated; it sometimes gives rise to nausea, but rarely to vomiting.

B.P. '14 requires not less than 2% Alkaloids. *For the methods of assay of Ipecacuanha and other chemical data see Vol. II.*

F.I. agreed the root bark only to be powdered, rejecting the woody portion. The powder should have an alkaloidal strength of 2%. Fr. Cx. also requires 2% alkaloids and directs it to be estimated for alkaloid on a sample powdered as directed under Poudre d'Ipecacuanha: powdering in a covered iron mortar and passing through a fine sieve to the extent of three-quarters of the weight of root taken.—*i.e.*, rejecting the woody portion.

U.S. allows both *Cephaelis Ipecacuanha* (*Rio*) and *C. acuminata* (*Carthagena*) if yielding 1·75% Ether soluble alkaloids.

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* F.I. uses the name *Uragoga Ipecacuanha*.—Baill.—P.G. VI. has this.

Ⓟ **Tablets of Ipecacuanha Powder** contain $\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{4}$ and 5 grains
Ⓟ **Pills** have been prepared salol-coated with a view to their dissolving in the intestine only. '**Stearettes**' *q.v.* are preferable.
Ⓟ **Extractum Ipecacuanhæ Liquidum**, *B.P.* '14.
Dose.—$\frac{1}{2}$ to 2 minims (**0·03 to 0·12 Cc.**).
Made by extraction with 90% Alcohol and Standardised to 2% Alkaloids
Ⓟ **Fluidextractum Ipecacuanhæ, U.S. X.** 1=1 by hydro-alcoholic percolation. Standardised to 1·5 Gm. alkaloids in 100 Cc. *Average dose.*—Emetic, 15 minims; expectorant, 1 minim. P. Helv. has Liquid Extract containing 'at least 2% Emetine and Cephaeline.'
Ⓟ **Extractum Ipecacuanhæ,** Fr. Cx.—Extract the root with 70% Alcohol, and evaporate to firm extract.
Ⓟ An **Elixir** has been made with Liquid Extract 1, Alcohol 90% 1, Glycerin 5, Water to 20; may be dispensed with alkalis. *Dose.*—As expectorant, 10 to 30 minims.

ℙ **Pulvis Ipecacuanhæ Compositus.** (Exempted from ℍ.)
Syn. Dover's Powder (*B.P.* '14).
Dose.—5 to 15 grains (**0·3 to 1 Gm.**).
Ipecacuanha 1, Opium 1, Potassium Sulphate 8. Is diaphoretic and anodyne; 10 grains at bedtime for an acute catarrh or coryza followed at once by a hot drink and 5 grains of quinine next morning.—Tilley.
ℍℙ **Poudre d'ipecacuanha opiacée.**—Fr. Cx. *Max. single dose* 15 grains. Max. during 24 hours 60 grains. Is the same but has Potassium Nitrate and Potassium Sulphate 4, *vice* Potassium Sulphate 8.
ℙ **Tablets** of Dover's Powder, 5 grains (**0·3 Gm.**).
Note.—**Dover's Powder** is named in Ph. Ned. V. Pulvis Opii Compositus see p. 626.
F.I. Second wanted the name **Pulv. Opii et Ipecac. Co.** for the preparation containing Ipecacuanha.
Aspirin with Dover's Powder, see Aspirin.
Ⓟ **Syrupus Ipecacuanhæ, P.G. VI; (F.I.)**
Ipecacuanha Tincture 1, Syrup 9.
Fr. Cx. has 'Sirop' 1% of Extract made by dissolving Extract 1 in Alcohol 70% 3, and mixing with Syrup 100; intended as an emetic. That of F.I. is not emetic in usual doses.—Fr. Cx.

Ⓟ **Tinctura Ipecacuanhæ.**—Fr. Cx.; P.G. VI. (standardised to at least 0·194% Emetine=$C_{30}H_{44}O_4N_2$), **P. Belg.; P. Hung.**—10% of root by percolation with Alcohol 70%—as required by F.I.

Ⓟ **Trochisci Ipecacuanhæ.**—$\frac{1}{4}$ grain (**0·015 Gm.**) in each, with Simple basis (*B.P.*'14) or Fruit basis (*B.P.* '98).
Ⓟ **Trochisci Morphinæ et Emetin** (Trochisci Tussis) contain Morphine $\frac{1}{40}$ grain with Emetin $\frac{1}{80}$ grain. In bronchial asthma.
Ⓟ **Unguentum Ipecacuanhæ et Crotonis.**—Sawyer.
Pulvis Ipecacuanhæ 1, Linimentum Crotonis 1, Adeps Benzoatus 2. A powerful counter-irritant, rubbed on the skin of epigastrium relieves gastralgia.

Ⓟ **Vinum Ipecacuanhæ** (*B.P.* '14).
Dose.—As an expectorant, 10 to 30 minims (**0·6 to 2 Cc.**); as an emetic 4 to 6 drachms (**15 to 22 Cc.**).
B.P.'14 uses Liquid Extract of Ipecacuanha 1 to Sherry 19. It is better, however, to prepare with detannated wine. Is given in 2 to 5 minim doses to allay the vomiting in pregnancy.

Mistura Expectorans, St. Th. H.

Dose for infants.—1 to 2 drachms.

Vinegar of Ipecacuanha, *B.P.*'98, 15 minims, Ammonium Acetate Solution 2 drachms, Vinegar of Squill 8 minims, Glycerin 40 minims, Chloroform Water to 1 ounce.

ℙ1 **Emetina.** *Syn.* IPECINE.—$C_{29}H_{40}N_2O_4$=480·328.

Emetine was discovered by Pelletier, 1817. Further details—B.M.J. i./21,59.

The formula of Carr and Pyman as above stated was confirmed by Karrer (1916), who also claims to have discovered independently the formation of Emetine by the methylation of Cephaëline.—C.D. Apl. 28/17.

A new constitutional formula for Emetine.—W. H. Brindley and F. L. Pyman, J.C.S.,'27,1067.

In the stable neutral salts the bases are combined with *two* equivalents of Acid. Basic Salts also exist. Both this alkaloid and Cephaëline are lævo-rotatory.

A white powder darkening on exposure. ***Soluble*** in water 1 in 600 at 15·5° C., 1 in 900 at 40° C.—by our expts., January, 1924. Soluble also in ether, alcohol, and chloroform.

ℙ1 **Emetine Hydrochloride** P. Jap. IV.; FR. Cx. Supp. II., P.G. VI. $C_{29}H_{40}N_2O_4 2HCl, 6H_2O$=661·3512. Ph. Ned. V. has "varying quantity" of water.

P. Ital. V. allows 20% and F.E. VIII. 19% moisture. P. Belg. IV. is anhydrous. Water 10–11.5% (4 mol.) suggested. International variation.—P.J. ii./30,242.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain (**0·0006 to 0·0025 Gm.**) *per os* as an expectorant, but larger doses, *e.g.*, $\frac{1}{4}$, $\frac{1}{2}$ grain are given in 'Stearettes' and Salol-coated pills in amœbic dysentery. As an emetic *per os* $\frac{1}{12}$ to $\frac{1}{6}$ grain (**0·065 to 0·01 Gm.**) has been given. ***Hypodermically*** in amœbic dysentery $\frac{2}{3}$ grain twice daily for 12 days with examination of stools for amœbæ and cysts.—A. G. Phear.

FR. CX. Supp. II. has maximum dose 0·1 Gm. per dose and per diem. P. JAP. 0·05 and 0·15 Gm. respectively.

Cumulative Action.—There is a possibility of this from long use, but certainly in our experience there have *been very few reports of anything of the kind.* See also Vol. II.

Poisoning may result. Bad effects on kidneys and liver. Experiments on cats show that 1½ grains per day for man should not be exceeded.—H. H. Dale.

Emetine Hydrochloride 0·12 Gm. intravenously or 1·8 Gm. hypodermically would probably be toxic to a man of 60 kilos. The maximum safe dose for man would be 0·06 Gm. intravenously or 1·2 Gm. subcutaneously. A total dose of Emetine hypodermically even if spread over several weeks is the limit of safety. —Dalimier, Presse Méd. per P.J. i./17,319.

Single dose should not exceed 1 mgr. per kilo (*i.e.*, 1 grain for a man) and total dose 10 mgr. per kilo. It is slowly excreted and is cumulative.—H. H. Anderson and C. D. Leake, Am. Jl. Trop. Med., 1930, per M.A.,'31,17.

INTRAMUSCULAR injection satisfactory.—P. Figdor, L. ii./17,258.

Intravenously ½ grain to ⅔ grain in 5 Cc. Normal Saline has been given—the best plan in desperate cases.—Sir L. Rogers.

Soluble about 1 in 9 in water, but this is not permanent at 15·5° C.—it is safer to use 20 parts of water at least. The addition of Hydrochloric Acid throws out the acid salt which is less soluble.

Injections made with Distilled Water are less irritant than those made with Normal Saline. Solutions in ampoules stand sterilising.—Y.B.P., 1919, p. 12.

Pharmacology of Emetine.—It depresses and may eventually paralyse the heart. It is a powerful gastro-intestinal irritant whether given *per o.* or hypodermically. May be source of danger in pathogenic condition.—E. J. Pellini and G. B. Wallace. Am. Jl. Med. Sc., J.A.M.A., 1916, *67*, 975 pe P.J. ii./16,413.

Uses.—The standard treatment for amœbic dysentery (see als Emetine Periodide and Auremetine). It has also been successfully used in bilharziasis, cholera, Guinea worm, and Oriental sore (se p. 522 for references). Morphine habit (*q.v.*) has been treated.

DYSENTERY, TREATMENT OF, BY EMETINE INJECTION.

When amœbæ are taken fresh and vigorous from dysenteric ulcer in the bowel, Emetine has weak action on them. Prof. Dixon (B.M.J. ii./22,410) maintained that '*Emetine does not kill the amœba except in the human body*,' but Dobell and Laidlaw (Parasitology June, '26, L. ii./26,762), conclude that the alkaloid kills *E. histolytica* by ***direct action.*** They conclude further that 1 in 50,000 is th highest concentration of Emetine that the amœba will tolerate fo more than a short time—this is the threshold value of Emetine. I is 10 times more toxic than Stovarsol. The poisoning process o Emetine is slow. *A very small amount constantly present in th intestine for days or weeks would probably suffice to make life for E histolytica (though not E. coli) impossible.*

The Italian view is that streptococci are the active agent rather than amœbæ —R. Larkin, B.M.J. i./22,901.

Sir Leonard Rogers found that *hypodermic* injections of this salt were mos effectual in dysentery. $\frac{1}{6}$ grain (= about 15 grains of Ipecacuanha) given as a trial in first case,—acute hæmorrhagic amœbic dysentery—with good result Subsequently two doses of $\frac{1}{3}$ grain completely cured *without producing nausea or vomiting.* Two other cases—one chronic amœbic dysentery of $3\frac{1}{2}$ years standing and the other acute hepatitis, both cured similarly. In the latter case several $\frac{1}{2}$ grain doses were given. Temperature was promptly reduced —B.M.J. i./12,1424.

J. A. Tull Walsh states he used Emetine in dysentery with good results prior to Rogers.—See I.M.G., Sept., 1891 ; L. ii./12,1179.

HEPATO-BRONCHIAL FISTULA of five months' duration was cured by six hypodermic injections of 2/3 grain in 5 days.—B.M.J. i./13,574 ; L. /13,1132, 1546.

Amœbic dysentery in Egypt treated by $\frac{1}{3}$ to 1 grain hypodermically—thrice weekly.—E. J. Harpur and W. B. Waddad, L. i./15,255.

Sir R. Ross on the treatment of dysentery. Past experience in India Ipecacuanha given in massive doses. One grain of Emetine Hydrochloride given as a general rule either in one subcutaneous injection or in two doses morning and evening, then given three days consecutively with the same period intermitted or 5 days on and 5 days off. One week's treatment generally efficacious. As to the medicinal treatment of running acute dysentery heaped teaspoonsful of Bismuth Subnitrate are advised 3 or 4 times a day (Deek's treatment in Panama). Tannic Acid 10 grains is a useful addition. To prevent hepatic abscesses which continue to appear for years after attacks, continue Emetine periodically.—L. i./16,1.

When Emetine fails in dysentery, Decoction of *Simaruba Officinalis* in doses of 6 Gm. in 200 Cc. of water, a Wine made of seeds of *Brucea Sumatrana* or a Decoction of *Ailanthus glandulosa* recommended. *Locally* injections of Thymol 1 in 6,000, Silver Nitrate 1 in 1,000, Quinine 1 in 1,000 advised. Copper Sulphate 1 in 2,000, Tannin 1 in 500, Potassium Permanganate 1 in 4,000 have also been tried but are of no effect.—Prof. V. Gabbi, L. i./16,523.

Peculiar effects may be produced. In two fatal cases there was inability to swallow after food had reached the œsophagus ; hepatisation of the lungs and action on the heart.—Military Surgeon (American) 1917, *40*, 58.—Per P.J. i./17,139.

In acute dysentery irrigation of the large bowel with 0·5% Tannic Acid Solution often better than Emetine. As enema in conjunction with Emetine treatment also useful. Tannin 4, Iodoform 3, Sodium Chloride 6, Arrowroot 25, Water to 1,000. To be given in two enemata in 24 hours. Must be kept in the large intestine for 15 to 20 minutes.—Prof. S. Kartulis, B.M.J. i./16,144.

It is said there are ***nearly 2 million cyst-passers in England,*** and the question is often asked why the entamœba should cause dysentery amongst infected persons in the Tropics but not among those in temperate zones.—Per L. ii./26,762.

A case of amœbic dysentery contracted in England cleared up under courses of Emetine Hydrochloride 1/3 grain hypodermically.—M. N. Russell, L. i./26,229.

Emetine does not kill the Cystic Stage of the Parasite.—It kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.—G. C. Low, L. i./17,482.

The Relative Failure of Hypodermic Treatment with Emetine with dysentery carriers is probably to be explained by the entamœbæ being more or less shut off from the circulation and tissue fluids of the patient.

Small quantities (less than 10 grains in total) given hypodermically rarely rid a carrier of E. Histolytica of his infection.

Full courses of the drug (10—12 grains or more) are successful in about one third only of the cases treated.

Re-treatment with equal or larger amounts of the drug—of patients who have already received full courses, offers little hope of success.—Clifford Dobell in Special Report on Dysentery issued by Med. Res. Com. under Nat. Health Ins. (H.M. Stationery Office), 1917.

An individual who is in the carrier condition may at any time revert to one of acute amœbic dysentery. An infected person frequently suffers from periodic attacks of acute amœbic dysentery when only the large tissue-invading forms of E. histolytica are present in the stool. Between the attacks, when the acute symptoms have abated, the carrier condition maintains.—C. M. Wenyon, Protozoology, Vol. I, p. 190.

Emetine Injections in conjunction with Bismuth per os (James & Deeks).

Bismuth Subnitrate and Emetine Hydrochloride combined cure many cases. Emetine alone seldom cures. Give Emetine Hydrochloride hypodermically, ½ to 3 grains, to the limit of tolerance, then Bismuth Subnitrate, a ***heaped teaspoonful (180 grains)*** in a tumbler of water every 3 hours night and day in severe cases (in chronic cases continue for 2 or 3 months after convalescence with 3 or 4 doses daily). Etiology, symptomatology and treatment of intestinal amœbiasis.—W. M. James and W. E. Deeks, Int. Conf. Trop. Am., '24,271—308.

See also the experiences of Willmore and Martindale in England, p. 528.

Results gratifying even in most chronic cases.—U.F.C., '25,116.

In cases resistant to Emetine large doses of Bismuth Subnitrate effective: an important advance.—Sir L. Rogers, Int. Conf. Trop. Am., '24,316.

Possibility of toxic symptoms from the Bismuth attacking the ulcerated intestine. Small intramuscular injections of Bismuth suggested as more useful, in addition to Emetine.—A. R. Paterson, Int. Conf. Trop. Am., '24,329.

Neuritis of nerves of the arm due to excessive ingestion of Bismuth—½ lb. a month. Cured by Sodium Iodide intravenously.—A. A. Facio, Int. Conf. Trop. Am., '24,331.

Liver Abscess has been treated by 1½ grains hypodermically daily after successful surgical evacuation.—C. B. Pasley, L. i./15,1076. It may be necessary to repeat the treatment periodically.

The prevention and treatment of amœbic hepatitis and liver abscess.—Sir L. Rogers, L. i./22,463,569,677. See also B.M.J. i./22,224,264,345. Int. Conf. Trop. Am., '24,346-356.

Emetine is more efficacious in amœbic lesions of the liver in extirpating *entamœba histolytica* than when the parasite invades the bowel wall. Cases recorded show that Emetine should be used only as an adjuvant to surgical measures, *e.g.*, aspiration.—P. Manson-Bahr and R. M. Morris, L. i./26,69.

This does not agree with previous statements—see *ibid.* 156.

Emetine alone is sufficient to cure cases of liver abscess. Pain and inconvenience of aspiration undesirable.—V. S. Hodson, L. i./26,681. Manson-Bahr's reply *ibid.*

Aspiration *plus* Emetine cures hepatic abscess in the most certain way possible. After an injection of Cocaine, removal of pus relieves the patient.—E. Owen Thurston, L. i./26,784.

Diagnosis:

For Method of Searching Stools and Mucus for Amœbœ, see Dysentery, Vol. II.

Amœbic Dysentery. Difficulty in treatment and diagnosis of chronic cases whose course is often marked by alternating diarrhœa and constipation. Presence of *E. histolytica* cysts in stools can only be verified in about 30% of cases. In a further 40% diagnosis is supplied by use of **sigmoidoscope** and remainder is based on course and history of the case.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

Intestinal parasites found in symptomless carriers—*E. histolytica*, *E. coli*, *Giardia intestinalis*, *Chilomastix mesnili* and *B. coli* found on examination of stools of 120 patients in Jamaica Hospital.—H. H. Scott, per Jl. Trop. Med., Feb. 1, '23,49.

Intestinal protozoa endemic in Britain. *E. histolytica* found in a case of ulcerative colitis in a patient who had not been abroad.—B.M.J. i./21,276.

Bilharziasis. A total of 14 grains and a further total of 20 grains spread over a long period was not effectual but cure eventually under Antimony intravenously.—A. H. Harkness, B.M.J. ii./20,890.

As much as 0·12 Gm. (single dose) given intravenously in bilharzia. Ten to 12 injections at 3 to 5 days interval will cure, the total amount given being from 0·85 to 1·05 Gm.—Diamantis, B.M.J. i./21,70. *See also* B.M.J.E. i./20,33.

10 intradeltoid injections with 4 days' rest between each.—E. Debbas, Presse Med. d'Egypte, Feb., 1920, per Pres., Feb., '21,48.

Four 3 grain doses every third day intramuscularly sufficient. A child will stand 2½ grains.—'B.H.' B.M.J. i./21,586.

Commence with ½ grain initially intramuscularly for an adult and ⅓ grain for a child and work up to 1 grain for a child of 12. Injections generally given daily for 3 days and then 3 times a week for 3 weeks. Iron and Arsenic as tonic.—F. G. Cawston, L. ii./21,1049.

Japanese Bilharzia disease well treated by Emetine but there may be severe cardiac depression.—F. G. Cawston, B.M.J. ii./21,1031.

Emetine Hydrochloride, ⅛ to ¾ grain, in 1% Phenol solution intramuscularly, on alternate days, eradicates permanently.—F. G. Cawston, Jl. Trop. Med., May, 1922,112.

Bronchopneumonia in children. Though not a specific, it is of value, the febrile period is shortened, and the stomach is left free from irritation by expectorants. *Daily hypodermic injection*—up to 4 years, 1/9 grain: 4 to 10 years 1/6 grain: 10 to 15, 1/3 grain. Discontinue if no definite results after 6 injections.—C. R. Wilson, B.M.J. i./28,845.

Cholera well treated by hypodermic doses of 0·01 to 0·04 Gm., combined with Camphor injections and Saline.—Renault, I.M.G., July, 1914,271.

Guinea Worm. 17 cases treated successfully by Emetine given intravenously and *per os*.—E. Tournier, per Jl. Trop. Med., Mar. 15, '23,101.

Morphine Habit has been treated with Emetine, see **'Morphine Habit.'**

Oriental Sore. 2 cases cured in three weeks by 2 injections of Emetine Hydrochloride.—Caliceti, per Jl. Trop. Med., June 1, '23,201.

Pulmonary Suppuration. Emetine 1 grain daily for 8 to 12 days, preferably combined with Strychnine, of benefit. In some cases dramatic results, in others of no value, but never known to do harm.—A. J. Scott Pinchin, H. V. Morlock, L. ii./30,842, Pr., Sept., '31,345.

Pyorrhœa treated by local application of ½% solution in the hope of destroying *E. buccalis* the organism thought to be responsible. In addition ⅛ grain hypodermically daily for 8 days, or a dose of ½ grain the first day and

then after interval of a day ¼ grain on two successive days. A few drops of Liquid Extract of Ipecacuanha on the tooth brush as a routine measure might be useful—even as a prophylactic, or the following mouth-wash or pigment:

℞ **Pigmentum Ipecacuanhæ et Arsenici. R.D.H.** *Syn.* **Pigmentum Liquoris Arsenicalis.**

To be painted on the ulceration. *A drop or two only to be used.*

Ipecacuanha Wine ½ ounce, Glycerin 1 drachm, Liquor Arsenicalis to 1 ounce. *Caution Poison!*—F. B. Bowman, B.M.J. i./16,373.

See also Sir L. Rogers, Ind. Med. Gaz., April, 1915.

Good result from a mouth wash of Emetine Hydrochloride ½ grain in water 8 ounces.—B.M.J. ii./18,188.

RHEUMATISM, acute articular, resistant to all other forms of treatment, cured by Emetine.—Trolli, per Jl. Trop. Med., May 1, '23,149.

SPRUE treated by Emetine hypodermically and Vaccines.—Sir L. Rogers, L. i./14,1605.

TUBERCULAR HÆMOPTYSIS has been treated by 1 grain intramuscular doses with success.

The treatment relieves congestive conditions of the lung generally. Cardiac debility must be alleviated by other means first.—See also B.M.J. i./14,703; and Aubert Bouger and Chauffard, Bull. de l'Acad. de Med., Jan. 20, 1914; P.J. i./14,662.

℗ **'Sterules' of Emetine Hydrochloride** are prepared 1/6 grain (**0·01 Gm.**), ¼ grain (**0·016 Gm.**), ⅓ grain (**0·02 Gm.**), ½ grain (**0·03 Gm.**), in 15 minims (**1 Cc.**), and 1 grain (**0·06 Gm.**) in 20 minims (**1·2 Cc.**).

℗ **Emetine Stearettes** 1/3 grain. Emetine *per os* in amœbic dysentery gives good effect but not so rapid as hypodermically.

1/3 to 2/3 grains may be given without exciting any great nausea. —Sir C. P. Lukis, B.M.J. i./13,1357. The Stearettes protect the Emetine from the action of the gastric juice.

℗ **Vinum Emetinæ.** 4 grains of the Hydrochloride in 8 ounces of Sherry. Equivalent to Ipecacuanha Wine. *Dose.*—5 to 45 minims (**0·3 to 3 Cc.**).

℞ **Emetine Hydrobromide.**—$C_{29}H_{40}N_2O_4 2HBr,4H_2O$ = 714·238.

Dose—as for Hydrochloride.—*q.v.* for details.

White crystalline salt. ***Soluble*** about 1 in 70 only, of water, hence the Hydrochloride should be prescribed in preference. The addition of a little Hydrobromic Acid does not affect solubility.

℗ **Sterules of Emetine Hydrobromide,** ¼ grain in 25 minims (1·5 Cc.), and ½ grain in 40 minims (2·5 Cc.) are prepared.

℞ **Emetine-Bismuth-Iodide.** $C_{29}H_{40}N_2O_4.2HI.BiI_3.H_2O(?)$ = 1344·0192.

Dose.—Three grains (**0·2 Gm.**) [=approximately 1 grain (**0·06 Gm.**) of Emetine, or about 60 grains of Ipecacuanha] constitutes the average daily dose given after a full meal or last thing at night. Twelve doses are given in succession to make up the course. A less quantity, it is stated, may only lead to a relapse. A total of 60 to 70 grains (**4 to 4·6 Gm.**) may be necessary in some cases.

A brick-red powder containing approximately 30% Emetine. (1 Gm. Emetine-Bismuth-Iodide=0·4 Gm. nearly Emetine Hydrochloride $C_{29}H_{40}N_2O_4$, 2HCl, $6H_2O$.)

Manufacture.—Solve Emetine Hydrochloride 660 Gm. in water 32,000 Cc. and treat with excess of the following solution :— Bismuth Carbonate 290 Gm., Potassium Iodide 920 Gm , Concentrated Hydrochloric Acid 900 Cc., or *q.s.* to clear, and water 16,000 Cc. Collect precipitate, wash and dry at 40° C.

The formula we give for the compound indicates 35·7% of Emetine, but the substance is not a very definite compound—there is chance of loss of Emetine in the washing. *It should contain at least* 30%.

Solubilities.—Emetine-Bismuth-Iodide was introduced under an erroneous view. In contact with Physiological Acid the Emetine of the compound *is dissolved,* Bismuth Oxychloride being formed. It was, in other words, introduced under the mistaken impression that it passed the stomach intact. We gave details of experiments disproving this in our 17th Edn., p. 517, see also L. i./23,158.

Administration.—Preferably as "Stearettes" or Salol coated Pills (Keratin coating is of little use). Some, it is true, give it in slipules or cachets, uncoated, without heeding the vomiting. Even when given 'coated' there are often vomiting, purging, abdominal pain and cardiac depression from it.

Uses.—In particular it was advocated by Du Mez for treatment of *Entamœba histolytica* infected patients. It was said to be effective in removing cysts of the *amœba* from the fæces of chronic carriers, whilst treatment with Emetine hypodermically has been followed merely by an early recurrence of cyst-passing. (*See also* '*E.P.I.*'.)

The two treatments are sometimes combined.

A Medical Research Committee Report, reported it cured the majority of carriers. Large quantities are essential—not less than 30 to 40 grains in daily doses of 3 to 4 grains.

Histolytica-infected patients treated. Given *per os* on a full stomach in cachet. 1 grain thrice daily until 36 grains are given. The results surpassed the most sanguine expectations. Specific. Cysts and *amœbæ* vanished from fæces. No relapses ; whereas with Emetine Hydrochloride there were 17 relapses out of 24 cases treated. It is harmless to the other protozoa of the human bowel.—C. Dobell, B.M.J. ii./16,612,626. *See also* M. W. Jepps and J. C. Meakins, B.M.J. ii./17,645.

From the epidemiological as well as the medical standpoint this destruction of the encysted stage of the entamœba is of paramount importance. Hypodermic use of Emetine does not effect this. Best given at 10 p.m.—C. G. Imrie, and W. Roche.—L. i./17,17.

Emetine Diarrhœa.—Within limits this can be aimed at—it was aimed at in the old Ipecac. treatment. The bowel is thoroughly washed out—in addition to the specific effect. A few days after the course (12 doses) the stools become normal.—G. C. Low, B.M.J. ii./17,484.

Emetine Bismuth Iodide is of value in early stages and is capable of curing about 50% at that period, but when the disease becomes chronic it has proved a failure. Emetine alone in the acute phase is better, followed by Emetine Bismuth Iodide later. Risk of irritating action of Emetine Bismuth Iodide on the acutely inflamed bowel leading to serious intestinal hæmorrhage if used earlier.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

A good deal of the disrepute into which Emetine Bismuth Iodide has fallen may be due to the fact that we focus our attention on the one relapsing case that does resist all forms of treatment, and forget the 99 that go their way rejoicing. Chenopodium Oil should be tried in cases resisting Emetine treatment.—G. W. Goodhart, L. i./23,157.

Vomiting, if delayed (four hours after taking E.B.I.) does not mean that it will not be absorbed. It appears to indicate that it is beginning to take effect.—P. Manson Rennie, L. ii./22,1374.

Ⓟ **'Stearettes' of Emetine-Bismuth-Iodide** 1 grain (**0·06 Gm.**), 2 grains (**0·12 Gm.**) and 3 grains (**0·2 Gm.**).

These pass intact through the stomach and dissolve on reaching the alkaline juices of the duodenum and intestines, providing the alkalinity and bile secretion be adequate to effect the chemical reaction necessary. We proved some years ago that Keratin coating is practically useless.

Salol Coated Pills of the same strength are also made.

Major C. D. Roe, D.S.O., 4th Gurkhas, Bakloh, Punjab, India, states he was completely cured of Entamœba Histolytica dysentery (contracted in the Dardanelles) by Stearettes of Emetine-Bismuth-Iodide.

℗1 **Emetine Periodide** (termed for short '**E.P.I.**') $C_{29}H_{40}N_2O_4.6I$ =1241·920.

Dose.—In the treatment of amœbic dysentery the compound has been given as a course of 2 grains (**0·12 Gm.**) thrice daily for 15 days, after food, generally in Slipules and in conjunction with Slipules of Exsiccated Ox Bile, 5 grains (**0·3 Gm.**) each, taken simultaneously.

Doses as high as 5 grains of the Periodide, *i.e.*, $1\frac{2}{3}$ grains of Emetine have been given.

Manufacture. By the interaction of Emetine and Iodine in a suitable solvent. The Periodides vary according to the methods used.

H. M. Gordon and A. B. Prescott, Jl. Am. Chem. Soc., 1899, p. 237, prepared two different Emetine Periodides by precipitation on mixing a strongly acid solution of Emetine in water with a solution of Iodine in Potassium Iodide. To one they gave the formula $C_{28}H_{40}N_2O_5.HI.I_7$. We are ***not*** concerned with a hydriodide-periodide.

'E.P.I.' forms a dark purple crystalline powder containing about 38·7% Emetine and 61·3% Iodine.

Solubilities.—Insoluble in water and ether, but readily soluble in Acetone, and slightly soluble in Alcohol and Chloroform. Practically insoluble in physiological acid (0·2% Hydrochloric Acid).

Uses.—For amœbic dysentery and other protozoal infections essentially. In addition, it is suggested in sprue, cholera, typhoid and infections where Emetine in other forms has been tried. Brilliant results have recently been obtained with it in schistosomiasis. Being insoluble in the stomach, it causes no nausea or vomiting.

SCHISTOSOMIASIS.—The oral use clears up the urine of children intensely infected with *S. hæmatobium* as quickly and with almost as great certainty as Emetine Hydrochloride subcutaneously and without risk. One grain of the Periodide thrice daily for 15 days was given.—R. M. Gordon, Ann. Trop. Med. and Parasit., Aug. 13, '26,229; B.M.J.E. ii./26,76. For tropical use, it is suggested, a preparation of **Emetine Periodide in Dried Milk** (1 grain in 2 drachms, *i.e.*, 8 Gm.) will be of value. *Directions.*—Two heaped teaspoonsful in 30 ounces ($\frac{1}{2}$ cupful) of warm water. The majority of the children apparently successfully treated in 1926 were found to be passing live ova in 1930, but owing to the high degree of infection in the district it was impossible to say whether these were cases of relapse or reinfection.—R. M. Gordon and E. P. Hicks, Ann. Trop. Med., Oct. 22, 1930.

Relatively safe, but may cause vomiting unless patients are kept in bed on strict diet. Bilharzia infection often tends to die out of itself, and it seems desirable not to treat very young children, exposed to further infection, until a less toxic and more effective means of cure is available.—F. G. Cawston, B.M.J. i./29,890.

Amœbic Dysentery.—The use of the compound in refractory amœbic dysentery was the result of work conducted by the author for J. Graham Willmore. A continuation of the investigation led to

the introduction of **Auremetine** (page 528), which has been found to be even more effective. Willmore, in his first paper on the subject, (Roy. Soc. Trop. Med. and Hyg., London, May, 1923), dealing with 400 cases, suggested medication per rectum in addition, especially where ulceration of the lower bowel was seen by the sigmoidoscope. Emetine Hydrochloride 1 grain was given daily, intramuscularly, and 1 drachm of Emetol (page 527) daily, per rectum; each for six days on alternate days.

Concurrently, 2 *grains of Emetine Periodide were given in Slipules per os three times daily for fifteen days with* 5 *grains of Fel Bovinum thrice daily* in separate Slipules. The periodide was given after food.

Stovarsol has also been given with Emetine Periodide (see page 528) in these difficult cases with good effect.

Emetine Periodide appeared to be *the most efficacious and, at the same time, the least toxic of all the Emetine Preparations then tried.*

It permitted an intensive course of 90 grains in 15 days, and, if necessary, this was repeated after 10 days' interval; compared with E.B.I., it therefore shortens the period in hospital.

It caused no nausea, vomiting, depression and weakness like E.B.I. No cardiac dilatation, no emetine rash or desquamation and no neuritis, following 120 grains given in 20 days, were noted. The cases treated with 'E.P.I.' were the "insoluble residue," *which had proved refractory to all the known methods of anti-amœbic treatment for years.*

These cases were not refractory to Emetine only. 'Bayer 205,' Yatren, Conessine intravenously, Conessine-Bismuth-Iodide, Naphthalene Tetrachloride, Oleum Chenopodii, 'T.C.P.', by the mouth and *per rectum*, Dimol, Kerol, Proposote, Creosote, Turpentine, etc., and Kurchi, were all tried without success.

Action of Physiological Acid.—Unlike Emetine Bismuth Iodide, which was introduced under the erroneous assumption that it was not decomposed in the stomach, Emetine Periodide is practically unattacked by physiological acid, even at body temperature for three hours. On the other hand, in physiological alkali at 40° C. it is split up gradually into Emetine Base and Alkali Iodide. Emetine Periodide is ***insoluble in the stomach*** but slowly ***liberates Emetine*** base in ***the intestines.***

Summary.—1. Sigmoidoscopy should be performed with the utmost care, always without an anæsthetic, the instrument being guided by the eye, but *only some* 30 *cm. of the bowel can be seen.* The infection appears to trickle down the bowel.

2. There is nothing to be gained by pushing treatment that does not show early results.

3. Individuals vary in their susceptibility to Emetine. Caution is urged in cases where the myocardium is affected by malignant tertian malaria, influenza, pneumonia, diphtheria, etc. Patients must be kept at rest during its administration in concentrated form.

4. Surgical measures, such as appendicostomy and cæcostomy, may be required to save life in exceptional cases, but they are not followed by a greater percentage of ultimate cure.

Reports on Emetine Periodide (mentioned in the Discussion.)

G. C. Low tried 'E.P.I.' on six cases, most of them chronic resisters, and four of these were apparently going on satisfactorily, as they had not reported themselves again. Two had relapsed: one with well-marked signs of hepatitis and threatening liver abscess (*Entamœba histolytica* cysts in stools); the other parasitically, eleven days after cessation of treatment (*E. histolytica* cysts in stools).

A. Castellani confirmed Willmore's statements. 'E.P.I.' found satisfactory. It does not cure every case of chronic dysentery, but it is extremely useful.

P. H. Manson Bahr had tried E.P.I. in three chronic resistant cases. One relapsed in 50 days, one had remained free from symptoms for three months.

For further details consult the 18th Edition or the original paper by J. G. Willmore and W. H. Martindale in the Trans. Roy. Soc. Trop. Med. and Hyg., 1923, Vol. XVII, pp. 13—32.

Sir William Willcox states that he has used Emetine Periodide with success.

Emetol. (*Willmore—Martindale.*)

A solution of Emetine base, 1 grain (0·06 Gm.) in 2 drachms (8 Cc.) of Olive Oil, for rectal use in amœbic dysentery. *See* Edn. XIX., p. 535.

Dose.—Two drachms are added to 4 drachms (15 Cc.) or 6 drachms (23 Cc.) of Ether and 8 ounces (230 Cc.) of Olive Oil for use.

OTHER PREPARATIONS tried in amœbic dysentery.

Ipecacuanha.—In bolus and cachet, etc., in intensive doses of 30 to 45 grains a day, in smaller doses for months—were even less effective than Emetine Hydrochloride intramuscularly and Emetine Bismuth Iodide.

Ravaut's Paste (Bismuth Carbonate 100, Wood Charcoal 100, Ipecacuanha 4 to 6, Syrup 100, Glycerin 100) appears to have no real curative value.

In dose of 2 to 10 tablespoonsful on the first day; second day a capsule containing 0·1 Gm. Novarsenobenzol, third day the paste, and so on alternately for 10 to 20 days. P. Ravaut claimed in amœbic dysentery that appetite improved and there was no vomiting.

Pastils of Ravaut's Paste were made, each equivalent to half drachm, *i.e.*, two for dose. They can be swallowed whole, and have been well tolerated.

Decoction of **Simaruba** and **Granatum** was also ineffectual.

Kurchi Bark. A decoction of this bark and in compressed form is considered of value. It does not eradicate the infection but it at least keeps the amœbæ under control.

Activated Quinine (freshly activated with Potash prior to use) was tried as enema but in all of 22 cases there was relapse.

Conessine, the alkaloid of Kurchi Bark.—Major H. C. Brown found that this was equally as inhibitory to the growth of free-living amœbæ as was Emetine. The toxicity of Conessine in vitro to certain protozoa is increased in presence of alkali. If the toxicity of alkalinised Quinine to amœbæ is taken as 1, then Emetine is 5 times and Conessine is 14 times more toxic. It was therefore thought that Quinine base in alkali might be worth trying, Quinine being a harmless substance to begin with, and the results, so far, have been promising. It is probable that the other two alkaloids might be tried under the same conditions.—T. A. Henry, Roy. Soc. Trop. Med., May, 1923.

For *further data and by other observers*, and recent results with **Kurchi Bismuth Iodide**, *see* **Holarrhena.**

Stovarsol.—In view of the optimistic reports in the French Medical Press, trials were made in 1924 with this compound.

More cases were apt to relapse after it than after Emetine Periodide, but by combining the two drugs—giving 6 grains of Emetine Periodide and 8 grains of Stovarsol on alternate days, 10 each—the results obtained were better than with either drug singly..

When hepatitis is present, Emetine Hydrochloride hypodermically is combined with the above, and when sigmoidoscopy shows active changes, either Emetol in Ether-oil or activated Alkaline Quinine is given *per rectum* in addition.

The claim that Stovarsol (the same is true of CCl_4) cures *lambliasis* is absurd and may be dismissed at once; so far nothing has been found to eradicate this infection *in vivo*, and the best palliative treatment is still rest in bed, a milk diet and a simple Bismuth and Paregoric mixture with carminatives. Further, since fractional analysis shows that complete gastric achlorhydria is usually present in lambliasis severe enough to cause symptoms, it seems illogical to expect better results from medicines given by duodenal tube. Dilute Hydrochloric Acid in doses of 1 to 1½ drachms had no effect, clinical or other.—J. Graham Willmore, 1924. (*Lamblia* ref.—E. Marchoux, Jl. Trop. Med., Sept. 15, '23,295.)

Arsenobenzene and Emetine a useful combination—persist with resistant cases.—Jl. A.M.A. i./26,457, per Pres., Jan., '27,15.

Arsenobenzol, 0·1 Gm. tablets, 2 to 6 daily, found efficacious: cysts destroyed.—Presse Med., April, '26,497, per Pres., Jan., '27,15.

Treparsol, 4 tablets daily, has been used.—Pres., Jan., '27,15.

Recently, good results have been obtained in amœbic dysentery by a *combined treatment* employing ***Auremetine*** with ***Stovarsol*** and ***Bismuth***, *infra*.

*℗ **Auremetine** (T.M. 471016).

Dose.—In amœbic dysentery 1 grain four times daily in slipules to a total of 40 or 60 grains, or even 120 grains, by repeating the course.

A combination of the Periodides of Emetine and Auramine containing approx. Emetine 28%, Auramine 16% and Iodine 56%.

Pharmacology.

The potentialities of the aniline dye Auramine (*q.v.*) have been described by Fairbrother and Renshaw. It was thought that a combination of Auramine and Emetine might be more effective than Emetine Periodide, and as the result of experiments in the author's laboratory Auremetine was produced. Like Emetine Periodide it has the advantage of being ***practically insoluble in the acid of the stomach*** (only about 5% is decomposed after 4 hours at 40° C.) and it is slowly split up in the intestines with the liberation of the dye and Emetine base. Experimentally 20% of the substance was decomposed after 4 hours in Physiological Alkali at 40° C., but in the human intestine, no doubt, a complete decomposition occurs, since its administration is quickly followed by the passage of orange-coloured fæces.

Major H. C. Brown found that Auremetine, using a suspension in gum solution, was inhibitory to the growth of free-living amœbæ nearly to the same extent as Emetine or Conessine under the same conditions.—B.M.J. i./26,526.

M.L.D. in rabbits per os of Auremetine is 100 to 125 mgr. per kilo, as compared with 15 to 20 for Emetine Hydrochloride and 50 for Emetine Bismuth Iodide. In cats the figures were respectively 30—40, 15—20, 30—40 mgr. per kilo.—H. H. Anderson and C. D. Leake, Jl. Pharm. and Exp. Therap., July, '30,273.

Auremetine is a stable, dark maroon powder, insoluble in water.

Uses.—In amœbic dysentery Auremetine is a further advance in treatment upon 'E.P.I.'

Its use is not attended by vomiting, nausea, abdominal pain, or purging. It is less depressing than Emetine hypodermically, and it is not necessary to keep the patient in bed on this account alone.

Combined Treatment.

The following information, from a paper by J. Graham Willmore and W. H. Martindale (B.M.J. i./26,525), is based on the results of its use since 1924, and has recently been confirmed (1928).

1. '*Acute*' cases—that is, those with blood, mucus, and *E. histolyticæ* in the stools, or found in scrapings at sigmoidoscopy receive:—

(*a*) Auremetine 1 grain in gelatin capsule four times daily after food on alternate days for seven days, and then daily to a total of 40 or 60 grains.

(*b*) Stovarsol 4 grains three times daily for seven days, on alternate days with the Auremetine. Previously 4 grains twice daily for ten days, alternating with the Auremetine days, or even to fifteen days, was given.

(*c*) On Stovarsol days a rectal injection of Emetol, 2 drachms (=1 grain Emetine base), in ether 6 drachms and olive oil 12 ounces. (Time retained to be charted.)

(*d*) 'Panama bismuth' three-hourly for twenty days, and then three times daily.

2. **'Chronic' or cyst-carrying cases** are given :
(*a*) Auremetine, and (*b*) Stovarsol, on alternate days as described above.
(*c*) 'Panama bismuth,' three times daily before food.

3. When hepatic involvement is present 1 grain of emetine hydrochloride intramuscularly, alternate days for six days (that is, 6 grains in all), may supplement or replace the Emetol.

'Panama Bismuth.'—It has been the custom to administer massive doses of bismuth subnitrate (James and Deeks, Panama) in addition ; it is a good adjuvant. In the 'acute' cases a heaped teaspoonful, stirred up in soda water, was given every three hours (during the day, not at night) for twenty days, and then three times daily for an indefinite period ; in the cyst-carriers it was given three times a day from the beginning. Toxic effects should be watched for. See p. 521. Routine sigmoidoscopic examination is important.

Toxic Effects of Stovarsol.—Stovarsol is a useful addition, but certain individuals may show an idiosyncrasy towards it, especially after repeated courses. At least one death from this drug has been heard of, and one case under treatment developed intense dermatitis with purpuric spots after only 8 grains. The practice of giving one tablet every three hours until twelve have been taken—as advocated by some—is dangerous, and has not been found to give better results than any other method. As a minor measure of precaution patients are given glucose (1 lb. in 1 quart of orange and lemon water, to be taken in twenty-four hours) daily during its administration.

Results of Auremetine and Stovarsol.—The cases dealt with were the residue of pensioners infected during, or before, the great war, many of whom had been through every dysentery treatment in the country.

92% of cases treated by the method 'responded,' *i.e.*, the patient regained his health, lost all clinical signs and symptoms of his disease (including sigmoidoscopic findings), his stools were negative on repeated examination. It is impossible to guarantee permanent cure of chronic amœbic dysentery. Auremetine has given some gratifying and more hopeful *immediate* results than any other essayed.

Of 570 admissions to hospital during 4 years only one death directly due to dysentery (bacillary) in the series under review. The combined treatment employed since 1924 has been found preferable to Yatren.—J. Graham-Willmore, Proc. Roy. Soc. Med., Nov., 1928. G. Carmichael Low stated he had been treating dysentery for 28 years and agreed with the speaker.

'Remedies recently introduced in the Therapy of Amœbiasis.'

Increasing number of cases reported in persons who have never left the temperate zone. Emetine is the sovereign remedy for amœbic colitis and hepatitis. Combinations of Emetine Hydrochloride, with Emetine Bismuth Iodide, or Emetine Periodide, or Emetol, have also been used : but effective dose of Emetine is near the toxic dose and symptoms of Emetine Poisoning are very common. Bismuth Subnitrate (large doses) with Emetine, or Karlsbad Salts, has been recommended for intestinal amœbiasis. Native remedies not sufficiently tried to permit of definite opinion. Enemata of 40% Sugar solution, also duodenal or colonic irrigation of hot water with

Magnesium Sulphate, used with good results. Yatren thought superior to Emetine abroad, but opinion divided in this country. Stovarsol and Treparsol alone more frequently followed by relapses than Yatren, and the former is highly toxic. *Willmore's combined treatment with Auremetine, Bismuth, and Stovarsol, has stood the hardest tests and stands first in general usefulness among all the remedies at hand, being the least toxic and the most widely applicable of them all* —Otto Wilner (Peking), Jl. Trop. Med., Aug. 15,'28,207.

Intestinal amœbiasis. Modern methods of treatment have been further discussed recently. Yatren and Emetine Bismuth Iodide well spoken of by Manson Bahr. Raised yellow rash sometimes produced, hence Yatren best given ***per rectum*** during the day and the Emetine Bismuth Iodide at night. Sir Aldo Castellani ***preferred Emetine Periodide or similar drug.*** J. G. Willmore pointed out that Emetine Bismuth Iodide ***was introduced under an erroneous idea.*** It is decomposed in dilute acid and hence dissolves in the stomach causing nausea. Yatren is opaque to X-Rays and one can see how far it travels.—B.M.J. i./31,846.

Bacillary Dysentery.—Mechanical cleansing by irrigation important. 1% Salt with or without Sodium Bicarbonate 1 drachm to 1 pint, or Eusol 4 oz. to 1 pint. Ether 6 drachms to Olive Oil 12 oz. in acute cases. If the case 'hangs fire,' but never in the acute stages, Silver Nitrate 1 : 2,000 to 1 : 1,000.—J. Graham Willmore, Proc. Roy. Soc. Med., Nov., 1928.

Schistosomiasis in a child of 16 successfully treated with Auremetine. Live ova disappeared from urine in 24 days. Total dose 47 grains. No vomiting or ill-effects.—R. M. Gordon and E. P. Hicks, Ann. Trop. Med., Oct. 22, 1930.

Methyl-psychotrine, Emetamine and Iso-emetine, see Edn. XIX, p. 538.

ℙ1 **Cephaëline.** $C_{28}H_{38}N_2O_4$=466·3124.

A crystalline alkaloid, less soluble in ether than emetine, but soluble in caustic alkali solutions, and also darkens on exposure.

By Methylation it is converted into Emetine *q.v.*

ℙ1 **Cephaëline Hydrochloride,** $C_{23}H_{38}N_2O_4 2HCl$=539·206.

In doses of $\frac{1}{12}$ to $\frac{1}{8}$ gr. said to be a more powerful emetic than Emetine.

Ⓟ **Emetin—Extractive.**

Dose.—Expectorant $\frac{1}{16}$ to $\frac{1}{10}$ (**0·004 to 0·006 Gm.**), emetic $\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**), in pill or solution. An extractive substance soluble in water ; must be distinguished from Emetine.

LAMELLÆ.

Ophthalmic Lamellæ or Discs (*cf.* Index—Lamellæ—for the various medicaments employed) are prepared with Gelatin and a proportion of Glycerin. *B.P.* '14.—The discs are 3 m.m. ($\frac{1}{8}$ inch nearly) in diameter. Directions are given.

ℙ1 **Atropine Sulphate** *B.P.* '14 weigh $\frac{1}{50}$ grain = $\frac{1}{5000}$ grain in each ; Also prepared containing $\frac{1}{2000}$ and $\frac{1}{1000}$ grain.

𝔻 ℙ1 **Cocaine Hydrochloride** *B.P.* '14 weigh $\frac{1}{20}$ grain = $\frac{1}{50}$ grain in each. Ⓟ **Homatropine Hydrobromide** *B.P.* '14 weigh $\frac{1}{32}$ grain = $\frac{1}{100}$ grain in each. Ⓟ **Physostigmine Sulphate** *B.P.* '14 weigh $\frac{1}{50}$ grain = $\frac{1}{1000}$ grain in each.

LECITHIN, OVO-LECITHIN. Ph. Ned. V., F.E. VIII.

$C_{42}H_{84}NPO_9(?) = 777{\cdot}6832.$

Choline Di-Stearo-Glycerophosphate.

Dose.—Internally 3 to 5 grains (**0·2 to 0·3 Gm.**) preferably half an hour before meals, *vide* Emulsion. This dose may well be increased if it is digested, as an average egg contains 16 grains approx.

Subcutaneously $\frac{3}{4}$ to 2 grains (**0·05 to 0·12 Gm.**) in sterile olive oil every second day.

Manufacture.—It should be prepared from egg yolks by alcohol extraction.

For the Chemistry of Lecithin and its examination, vide Vol. II.

A yellowish wax-like mass. It is a constituent of the brain 11%, and of yolk of egg 7%; milk (human, cows'), etc., contains varying amounts, *cf.* Vol. II.

Lecithin is broken up by the pancreatic juice into Glycerophosphoric Acid, fatty acids and choline.

Soluble 1 in 30 of 90% Alcohol, Ether 1 in 5, Chloroform, Carbon Bisulphide, Benzol and fatty oils. It combines with certain metals, *e.g.* Copper.

Flavoring.—Prescribed as Elixir or Emulsion *q.v.*

Uses.—Where the phosphates excreted by the urine are high. Given in neurasthenia, various nervous diseases, diabetes, tuberculosis, tabes and general paralysis; also in all diseases producing a disturbance of nutrition. It is said to cause a marked increase in patient's weight, and to improve the general well-being; augments the blood corpuscles. Rickets and marasmus have been successfully treated with lecithin, and intramuscular injections of Sterile Oil Solution have also given relief. Use suggested in incipient tuberculosis, osteomalacia, pernicious anæmia, and the like.

Has given good results in myasthenia gravis (Gowers).

Cancer has been treated by $2\frac{1}{2}$ grains Lecithin injections.—J. T. Shirlaw. See also this authority's work, under **Sodii Oleas.**

Elixir Lecithin. *Dose.*—2 drachms containing 3 grains of Ovo-Lecithin, thrice daily half an hour before meals.

Emulsio Lecithin. *Dose.*—Half ounce, containing 5 grains of Ovo-Lecithin, thrice daily, as the Elixir.

No very hot fluids should be drunk for some time afterwards, so that the composition of Lecithin may remain unaltered.

In menorrhagia $1\frac{1}{2}$ to 3 grains of Lecithin thrice daily between the periods has been found useful.

Sterules for Intramuscular Injection. *Dose.*—$\frac{3}{4}$ grain (**0·05 Gm.**) of **Lecithin** in 1 Cc. of oil. Also Ⓟ with Strychnine $\frac{1}{120}$ grain.

Capsules and Tablets contain $1\frac{1}{2}$ grains (**0·1 Gm.**). **Tabellæ** of chocolate basis contain $\frac{1}{2}$ grain.

Pilula Lecithin.—Lecithin $1\frac{1}{2}$ and 3 grains.

Lecithin is contained in **Pilula Potentin Composita**, *q.v.*

℗ ✱"**Byno**" (T.M. 215670, 215671) –**Lecithin.** *Dose.*—One tablespoonful three times a day half an hour before meals. A proprietary containing Lecithin, Liquid Malt Extract with Cinchona and Nux Vomica alkaloids. Digestive nerve tonic and food. Each ounce contains 4 grains of Lecithin.

Effervescent Lecithin 3 grains in 1 drachm (a dose) is prepared.

Pilula Lecithin cum Ferri Iodido.—*Martindale.*

Contains 2 grains of Lecithin with 3 grains of Ferrous Iodide. In anæmia to increase metabolism and as a tonic in convalescence.

Powdered Lecithin. *Dose.*—10 to 15 grains (**0·6 to 1·0 Gm.**) thrice daily before food as powder or cachet.

A light yellowish powder containing 33% Lecithin flavoured with Saccharin and Peppermint Oil. When given prescribed as powders the dose may be mixed with ½ wineglass of water.

Lipoids. Walker's "Organic Chemistry" suggests there are various forms of these fat-like substances. (1) Cholesterol (2) Cerebrosides. These contain Nitrogen but not Phosphorus, and on hydrolysis yield among other things Galactose. (3) Phosphatides or Phospho-lipines.—*e.g.* Lecithin. See also Sapones and Vol. II.

LIGATURES.

Catgut Ligatures are obtainable commercially 'Raw' and Sulpho-Chromic in hanks in sizes Nos. 000,000 (the thinnest) up to No. 8.

Preparation of Chromic or Sulpho-Chromic Catgut Ligatures.

LORD LISTER'S DIRECTIONS.—Soak the catgut 24 hours in twenty times its weight of 'preparing liquid'—made as follows:—Dissolve Chromic Acid 4 in water 240 (weight), add Sulphurous Acid Solution (*B.P.* '14) *q.s.* to produce *green* colour of Chromium Sulphate $Cr_2(SO_4)_3$=392·172. Then add water to make 480 (weight), next add solution of Mercuric Chloride 2 in water 320 (weight). Dry the catgut on the stretch. The antiseptic Chromium Sulphate Solution, Lord Lister found the nearest approach to the ideal to produce a ligature capable of fulfilling the necessary conditions as to strength, elasticity and asepsis.

Ligatures are also supplied in carbolic acid solution 1 in 20, carbolised alcohol, turpentine, and various other antiseptics.

Immersion in **Clove Oil** 8 days, then in Alcohol 6—8 hours, has been advocated for sterilising. A further method is to heat the catgut gradually in **Cumene** to 70° C., then in the same substance to 170° C. for two hours. Finally to rinse in petroleum benzine.

By **Cumene** or **Cumol** is intended a hydrocarbon (a) Trimethyl-benzene $C_6H_3(CH_3)_3[1:3:4]$=120·0936 obtained by fractionation of Coal Tar, it boils between 160° and 170° C.—when pure at 169·8° or (b) Isopropylbenzene $C_6H_5CH(CH_3)_2$. The latter boils at 152° C.,—the former body is, therefore, more suitable for sterilising catheters. The names Cumol and Cumene, or better *Cymene*, as distinct from Cumene above are, however, also given to *p*-Methyl-iso-propyl-Benzene $C_6H_4\begin{cases}CH_3\\C_3H_7\end{cases}$ = 134·1092. This is obtained from Cumin Oil, and can be made from Camphor. It boils at 175° to 176° C., has Sp. Gr. 0·8678 at 12° C., and possesses a pleasant odour.

Hardening Treatment.—By soaking 1 hour (a) in 1 in 1000 Potassium Bichromate; these are two to three weeks—soluble. Or (b) more durable, *i.e.*, to last 5—6 weeks, use 1% solution for same period. The gut is supplied in Xylol in sealed tubes.

Iodised Gut (Claudius' Method).—Raw gut, which has been previously soaked in Ether to remove fat, is sterilised by soaking in a solution of Iodine 1, Potassium Iodide 1½, Distilled Water 100 for ten days. (Some use weak

Tincture of Iodine diluted 15 times with 50% Alcohol.) About 4 ounces of Solution is sufficient for half a dozen hanks. The Gut is then of a brown colour, in a sterile pliable condition and ready for use—remove and place in 3% Phenol or Normal Saline prior to operation.

Iodine-Formalin Catgut.

Catgut prepared with Iodine and Alcohol is washed with a weak Carbolic Solution; it is then treated according to its thickness in a 3% Formalin Solution for twenty-four hours, and washed in water. Store in a solution of Alcohol 50% containing 5% Glycerin and 0·5% Iodine.

Vide also **Iodo-Acetone.**

Fr. Cx. sterilises Catgut in absolute alcohol at 120° C. for 45 minutes in sealed tubes of hard glass.

Catgut sterilised with advantage by ether, chloroform, absolute alcohol or petrol in preference to "chemicals"—any one of them will render gut sterile in 24 hours.—G. S. Thompson, B.M.J. i./17,873.

Absorbable Iodine Catgut.—Catgut, defatted by ether, is boiled in absolute Alcohol for an hour, then placed in a solution of 1 part Strong Solution of Iodine and 11 parts of Water for a week. Keep in a solution of 1 part Strong Solution of Iodine and 50 parts Rectified Alcohol.

For the preparation of catgut on a large scale only three methods can be considered satisfactory—sterilisation by **Formalin** or **Hydrogen Peroxide** and **by heat.** Of 8 samples examined in 1927, 58 out of 77 ligatures were found infected. Of another batch of 36 not one was found sterile. Sterilisation achieved by treating with a watery solution of **Iodine**—the Iodine being removed after sterilisation. Catgut prepared by this method is now controlled under the ***Therapeutic Substances Act.***—M.R.C., Spec. Rept. Series, No. 138, W. Bulloch, L. H. Lampitt and J. H. Bushill, B.M.J. ii./29,918.

Biniodide is decidely less powerful in killing germs on the elastic layer of the small intestine of sheep, from which catgut is made, than Perchloride. ***Iodine found best.*** Immersed for 9 days, catgut will absorb 12% of its own weight of Iodine. Glycerin added makes for flexibility.—M. R. C. Report, L. ii./29,993.

Therapeutic Substances Act. 42 samples of catgut found contaminated. —P. Hartley, B.M.J. i./31,1072.

Peppermint Oil is bactericidal to staphylococci in dilutions up to 1 in 200. Diffusing power through Agar equals that of Perchloride. Raw catgut treated by immersing first in a Bichromate solution then in 1 in 10 solution of the oil in spirit for 2 hours at 60° C. Finally kept in 1 in 20 Carbolic in spirit. Suggested by Capt. S. R. Douglas, L. i./31,345.—A. E. Porritt, L. i./31,345.

Tabotamp.—Absorbable material made from catgut for packing wounds.

Kangaroo Tendon, St. G.H. is washed with Ether Soap, treated with antiseptics and preserved in Alcohol.

Horsehair, St. G. H., is boiled in water 10 minutes only.

Roeder's Method. Picric Acid, saturated solution in Clove Oil. Leave the gut one week in this. Rinse 10 seconds in water and store in 95% Alcohol. In 4 days it is ready for use. It is an advantage to formalise in 5% solution for 24 hours first.—J. D. S. Sinclair, L. i./16,212.

Silk Sutures are supplied on reels and in hanks, sizes 0, 1, 2, also sterilised in Absolute Alcohol and Phenol Solution. Sterilised by immersing in Olive Oil for 12 hours and then boiling in the same and keeping in Carbolised Spirit, In infantile paralysis silk ligaments cause formation of a tough tissue or tendon.

Silkworm Gut, extra fine, fine, medium and stout—is made in 10 and 14 inch lengths.

Silkworm Gut Sutures are a natural product, being simply strands drawn from the silkworm, and come for the greater part from Spain. There is no synthetic product sold as Silkworm Gut.

LITHIUM.

Li=6·94.

Lithium Salts have long had a reputation for assisting in the elimination of Uric Acid, but their effect is probably analogous with corresponding Potash Salts. They should be given freely diluted.

Lithium Poisoning by large doses of Chloride taken experimentally, *e.g.*, 2 Gm. three times a day before meals. In all, 4 doses, *i.e.*, 8 Gm., were taken. After the 4th dose taken next night, there was marked dizziness and sleep was impossible. Weakness and tremors were intense the next day. Ocular and aural symptoms lasted 36 hours. There were no gastric intestinal symptoms and appetite remained good.—L. i./13,1815.

Lithii Benzoas, $C_6H_5COO\ Li=127·979$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) or more.

Usually a light white crystalline powder, Antilithic, ***Soluble*** about 1 in 4 of water, about 1 in 12 Alcohol 90%. ***Incompatible*** with Acid and Sodium Bicarbonate.

Lithii Bromidum, Li Br.=86·756.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White, deliquescent, slightly bitter granules, neutral reaction; very soluble in water and alcohol.

Contains 91% Bromine as against 67% in Potassium Bromide, hence effect is greater, especially as a hypnotic, and in epilepsy.

Lithii Carbonas. $Li_2CO_3=73·88$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**). **Tablets,** 5 grains. Soluble in water about 1 in 70. Diuretic, thought to increase the alkalinity of the blood.

Lithii Citras. $C_3H_4OH(COOLi)_3.4H_2O=281·9214$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). **Tablets** 5 grains.

White crystalline powder. Diuretic. ***Soluble*** 1 in 2 of water.

Effervescent Lithium Citrate.

Dose.—1 or 2 drachms (**4 to 8 Gm.**). Contains 1 in 20.

✱**'Vescettes'** (T.M. 260597) of **Lithia,** contain 3 and 5 grains.

Lithii Citras Laxativus Effervescens, B.P.C.—30% Sodium Phosphate, 10% Lithium Citrate.

Dose.—60 to 120 grains. A diuretic purgative and antilithic.

Lithii Guaiacas, Lithium Guaiacate.

Dose.—5 grains (**0·3 Gm.**) in pill twice a day.

Prepared by digesting guaiacum resin in solution of lithium oxide, decanting the solution, evaporating, and scaling it. Contains Lithium Oxide 1, Guaiacum Resin 3. For gout and rheumatism.

Lithii Hippuras. $CH_2NH.C_7H_5OCOO.Li=185·0104$. (May contain $2H_2O$.)

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In light white minute crystals, soluble in water 1 in $2\frac{1}{2}$, is a powerful solvent of lithates; useful in gout and rheumatism, *cf.* Piperazin. **Vescettes** contain 5 grains. **Effervescent Lithium Hippurate** 5 grains in 1 drachm.

Lithii Iodidum, Li I=133·872.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline deliquescent powder containing 94·7% iodine. An antiarthritic and has been employed in syphilis, also in rheumatoid arthritis by iontophoresis, *q.v.*

Umbrenal, a 25% Solution of Lithium Iodide filled in ampoules of 12 Cc. Used as a contrast in pyelographic work.

Lithii Salicylas. $C_6H_4OH.COOLi$=143·979.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) for rheumatism and gout. A deliquescent white powder ***soluble*** 1 in 1 of water, forming a neutral or slightly acid solution.

Incompatible with acids and with Sodium Bicarbonate.

Varicose Veins have been treated with this Salt with Tutocaine added; also **Lithium Salicylate** and **Quinine Urethane** *see pp.* 65, 66.

Effervescent Lithium Salicylate contains 1 in 30.

Dose.—1 or 2 drachms.

Lithii Sulphas $Li_2SO_4H_2O$=109·9396.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

White crystals soluble in Water and Alcohol.

Lithii Tartras Acidus.

CHOH. COOLi. CHOH. COOH, $1\frac{1}{2}$ H_2O=183·0124.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystalline powder, used in gouty cases with gum affections.

Lithion is a granulated (non-effervescent) preparation composed of lithium citrate, magnesium sulphate, sodium sulphate, etc. *Dose.*—One-half to one teaspoonful taken in a little warm water.

LOBELIA (*B.P.* '14), U.S., P. Ital. V., P. Belg. IV., F.E. VIII.

The dried flowering herb *Lobelia inflata* (*Lobeliaceæ*). Has purgative and emetic properties, but its chief use is to relax spasm of the bronchi in asthma and bronchitis. It is contained in many anti-asthmatic powders (*vide* **Pulvis Lobeliæ Composita**).

Ⓟ **Tinctura Lobeliæ, U.S. X.** 1 in 10 of Alcohol (49% by vol.). *Average dose* 15 minims (1 drachm as emetic). F.I. agreed 1 in 10 Alcohol 70%. Fr. Cx., Max. single dose 30 minims approx., max. during 24 hours 95 minims approx.

Ⓟ **Tinctura Lobeliæ Ætherea** (*B.P.* '14). 1 in 5 Spirit of Ether.

Dose.—5 to 15 minims until nausea occurs.

In atonic constipation with dryness of the fæces the Tincture in 10 minim doses, combined with Cascara, useful.—H.

[P] **Lobeline.** $C_{22}H_{27}O_2N$=337·2186.

(We have taken this formula, having regard to that used in P.G. in describing the Hydrochloride.)

A crystalline alkaloid obtained from *L. inflata.* A powerful respiratory stimulant, but should be used cautiously in patients with enfeebled myocardium. Probably more effective combined with a cardiac stimulant.

Suggested dose (as a soluble salt) 10 mgr. intravenously (Curti and Wright). Effects not lasting. Used by Sir Wm. Willcox with beneficial results in case of new growth in chest associated with dyspnœa, and in persistent hiccup. It has been used in coal-ga and Morphine poisoning. Of greater use in respiratory emergency —B.M.J. ii./26,1226; for pharmacology see F. R. Curtis and S Wright, L. ii./26,1255-58.

Lobeline used to prevent coma in Morphine poisoning, restore respiration after anæsthesia, and to counteract effects of gas-poisoning. As an antidot after taking 8 Cc. of Tinct. Opii: first 3 mgr. given intravenously, then 1(mgr. hypodermically, then a further 3 mgr. intravenously. Patient recovered. —P.J. ii./26,328.

ℙ1 **Lobelinum Hydrochloricum**, P.G. VI., P. Belg. IV.
$C_{22}H_{27}O_2N.HCl = 373{\cdot}6836$.

Max. dose.—$\frac{1}{3}$ grain (**0·02 Gm.**) : *pro die* $1\frac{1}{2}$ grains (**0·1 Gm.**).

1 Cc. ampoules of 1% solution are made. *Solutions must not b heated.*

ℙ1 **Lobelin Ingelheim** has subcutaneous or intramuscular dose for childre $\frac{1}{20}$ grain (0·003 Gm.). Subcutaneously $\frac{3}{20}$ grain (0·01 Gm.) for adults. In travenously for adults $\frac{1}{20}$ to $\frac{3}{20}$ grain (0·003 to 0·01 Gm.) very slowly.—Pres. '27,68, and makers' printed matter.

ℙ1 **Lobeline Sulphate** is also manufactured.
White crystals soluble 1 in 1 (by our experiments, 1927).

Ⓟ **Lobeline Sulphate Tablets,** $\frac{1}{20}$ grain, for hypodermic use as a spina sedative and relaxant.—P.J. i./26,53.
Patented method of extraction of alkaloids.—Y.B.P., 1922,11.

MAGNESIUM.

Mg = 24·32.

Magnesii Carbonas Levis (*B.P.* '14). $3(MgCO_3)Mg(HO)_2,4H_2O =$ 383·358. (This formula is not given in the B.P.). Is prepared by precipitation of Magnesium Sulphate Solution with Sodium Carbonate. **Magnesii Carbonas Ponderosus,** similarly in more con centrated solution and by boiling and evaporation to dryness and washing with water to remove Sulphate. *Dose.*—30 to 6(grains, or 5 to 20 grains repeated.

A useful substance for clarifying liquids from suspended matter.

Liquor Magnesii Bicarbonatis (Carbonatis) (*B.P.* '14). Fluid Mag- nesia. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**).

A colourless liquid, containing 10 grains of Magnesium Carbonate in 1 ounce of Carbonic Acid water.

Sippy's Powder.
Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Gm.**) in water.
No. 1—Magnesium Carbonate and Sodium Bicarbonate equal parts.
No. 2—Calcium Carbonate and Sodium Bicarbonate equal parts.
Sippy's method of treating gastric ulcer was by checking acidity of the gastric juice to prevent further corrosive action. *Cf.* Maclean's Powder, p. 224.

Magnesia Levis and Magnesia Ponderosa (*B.P.* '14). MgO = 40·32. These are prepared from the respective carbonates by exposure to a dull red heat. *Doses* as for carbonates. Antacid, antilithic, diuretic, laxative.
Magnesia should never be prescribed as compressed tablets since they do not dissolve and may form the nucleus of calculi.—Per P.J. i./25,470.

✱**Bisurated** (T.M. 340411) **Magnesia.**—*Dose.*—Half teaspoonful in water after meals. A proprietary article termed 'an Antacid,' in form of a white powder.

Mannich and Leemhuis find it to contain approximately Bismuth Carbonate 8, Sodium Bicarbonate 40, Magnesium Carbonate (probably heavy) 52. —P.J. ii./13,257,563.

Liquor Magnesii Citratis U.S. X. *Limonade Purgative au Citrate de Magnèsie.* Fr. Cx.

Average daily dose.—12 ounces.

Magnesium Carbonate 15, Citric Acid 35, Syrup 60, Potassium Bicarbonate 2·5, Oil of Lemon 0·1, Water *q.s.* to 350.

The formula is unduly acid. The acid should be 30 or less. Further suggestion should be made in the text that where there is Acid intolerance in the adult and in the case of children, a level teaspoon or more of Sodium Bicarbonate should be added after the bottle has been opened and effervescence has ceased.—J. W. England, Am. Jl. Ph. Sept. '24.

Limonada Rogé in S. America is similar to Fr. Cx.—Ph. Notes.

Magnesii Chloridum, $MgCl_2 6H_2O = 203{\cdot}3276$. *Dose.*—30 to 60 grains (**2 to 4 Gm.**) increased.

Deliquescent crystals, very soluble in water. Mild purgative, a dose in ½ pint of hot water useful for constipation and in dyspepsia and stomach disorders.

War wounds have been treated with 1·2% Solution.

Magnesii Chloras. $Mg(ClO_3)_2, 6H_2O = 299{\cdot}3276$.

Deliquescent white crystals made by decomposing the barium salt with Magnesium Sulphate.

Pharmacology.—

Less toxic than Magnesium Chloride. Average lethal dose in rats intraperitoneally 1·1 and 0·22 Gm. respectively. Purgation and diuresis ensue with either salt—large doses intravenously cause heart failure. Toxic symptoms neutralised by Calcium Chloride injections.—J. L. Ulrich and V. A. Shternov, Jl. Ph. & Exp. Ther., Jan. '29,12.

Has been used in form of ointment (20%) on epithelioma of the lip.

Magnesii Hydroxidum, $Mg(OH)_2 = 58{\cdot}3356$. Magnèsie Hydratée. Fr. Cx.

Dose.—5 grains to 2 drachms (**0·3 to 8 Gm.**).

Prepared by decomposition of Magnesium Sulphate 24½ with Sodium Hydroxide 8 in solution, the precipitate washed free from sulphate and dried at low heat.

According to the Fr. Cx., calcined magnesia is boiled with 20 to 30 times its weight of distilled water 20 minutes. Dry as much as possible by collecting on calico and finally at 50° C. until it no longer loses weight. Thus prepared, Magnesium Hydroxide contains 31% H_2O.

It dissolves more freely in dilute acids than calcined magnesia. It is a recognised antidote in arsenical poisoning.

✱**Alkagen Tablets** (T.M. 347033). *Dose.*—1 to 3 with water. Contain Magnesium Hydroxide and Peppermint Oil. For acidity, flatulence, etc. It is not open to the objection that Carbonic Acid is liberated as in the case of Carbonates and Bicarbonates.

Pulvis Magnesii Hydroxidi cum Carbone.

Dose.—1 to 2 drachms in a little water after meals.

Magnesium Hydroxide 1, Wood Charcoal 2.

Is suggested in dyspepsia. The Magnesium Hydroxide is antacid and the charcoal has the property of gas absorption. Furthermore, the charcoal would tend to preserve the hydroxide.

A little cinnamon powder (1 in 8) is occasionally added.

Cremor Magnesiæ. Magnesia Cream.

Dose.—1 to 4 drachms in a little water.

A palatable concentrated preparation. Each ounce represents 2- grains of suspended Magnesium Hydroxide. Antacid withou evolving Carbon Dioxide—hence no distension is caused.

Uses.—In indigestion, dyspepsia, acidity, rheumatism, and as ar alkaline mouth wash, forming a film of Magnesium Hydrate over the tooth surface. A useful antidote in case of poisoning by mineral acids.

Magnesii Lactas.—$(C_2H_4\,OH.\,COO)_2Mg.\,3H_2O = 256{\cdot}4448$.

Dose.—15 to 60 grains (**1 to 4 Gm.**). White crystalline powder. ***Soluble*** 1 in 30 of water.

Useful in some cases as a hæmostatic where Calcium Salts do not seem to act. A dose of 30 grains usually reduces time of coagulation of the blood 30%, *e.g.*, from 2 to 1¼ minutes. The salt can be made extemporaneously by the dispenser, if prescribed in a mixture, from Magnesia, with Lactic Acid *q.s.* The large dose of the bulky powder, if ordered in that form, is inconvenient to take. Note.—Magnesium Oxide 1 requires Lactic Acid (75%) about 5 to dissolve it.

Oozing of blood from the gums has been well treated by 40 to 60 grain doses. For erosion of bone, due to scurvy, this and the Calcium Salt are valuable.—Sir A. E. Wright.

Magnesii Phosphas (Tribasic). $Mg_3(PO_4)_2,7H_2O. = 389{\cdot}1092$. Contains approx. 70% $Mg_3(PO_4)_2$.

Dose.—15 to 75 grains (**1 to 5 Gm.**).

Used as an antacid. As employed by A. F. Hurst. Does not produce systemic alkalisation. Has laxative action. *See also Tribasic Calcium Phosphate.*

✱**Neolyse** (T.M. 415231). A preparation of Silico-Magnesium salts. It has been advocated for the palliative treatment of malignant disease. Magnesium salts, it is thought, tend to destroy superficial cancerous growths, and they give encouraging results in inoperable cancers. Where the drinking water has a marked content of Magnesia salts, cancer is said to be rare. Magnesia and Silica, perhaps, play the same part in cancer that Lime does in tuberculosis. Lengthy treatment would be required. The Silica compound would be slowly eliminated.

Cachets of Neolyse. *Dose.*—1 cachet thrice daily before meals for 20 days, then interrupt treatment for 10 days, and continue until the desired result is obtained.

Neolyse injections and **Compresses for local use** are prepared.

Magnesii Sulphas. Sel Anglais, P. Belg. IV., Sel d'Angleterre, Sel de Sedlitz Fr. Cx. $MgSO_4.7H_2O = 246{\cdot}4892$.

Dose.—2 to 4 drachms or 30 to 90 grains repeated (*B.P.* '14).

Soluble 10 in 13 of water—measuring 18·5. The salt is not hygroscopic.

Incompatible with Soda Tartarata and Alkaline Carbonates.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Cinnamomi.

Solutions kept ready for dispensing should be sterilised; this will effectually prevent the fungoid growth which occasionally occurs.

Pharmacology.

This salt *per os* does not act by attracting fluid into the intestine, since the watery stool following ingestion contains none of the salt. This is passed in the solid stool on the following day. It is suggested that its purgative action

depends upon a duodeno-colic reflex analogous to the similar but less painful reflex produced by food.—M.P.C., July, 14, '26.

Subcutaneously in small doses (5-10 grains) Magnesium Sulphate produces a carthartic action.—Prof. Dixon.

Intravenously in large doses it is toxic and may produce death. The non-toxic dose should not exceed 0·1 Gm. per kilo weight and should not be given in a concentration exceeding 10%.—H. J. Stander, Jl. A.M.A. i./29,636.

Uses.—Largely employed as an efficient evacuant.

Intraspinal Anæsthesia has been induced by injecting Magnesium Sulphate in dilute solution.

CHOREA treated by 1 to 5 Cc. of 25% Solution of the *pure* salt. Weaker Solution, *e.g.*, 7·3%, which is isotonic with the cerebro-spinal fluid, was, however, advised—of this 3·4 Cc. = 1 Cc. of the 25%. See also M.P.C., Oct. ii./22, 303.

DYSENTERY in South Africa was treated by the "Evacuant Method"—Magnesium and Sodium Sulphates, Castor Oil, Calomel, also with Ipecacuanha Powder.

EPIDEMIC ENCEPHALITIS greatly benefited by Magnesium Sulphate, 4 Cc. of a 25% solution, intramuscularly.—E. Matthew, L. i./24,1156.

ECLAMPSIA, Suppression of the convulsions in.—Intrathecal injections of 25% Magnesium Sulphate Solution, allowing 1 Cc. for every 25 lbs. (approx.). —L. ii./12,1575.

ECLAMPSIA.—***Intravenously,*** 10 to 25 Cc. of a 10% solution, gave good results. Convulsions controlled, œdema reduced and diuresis promoted.—Am. Jl. Obstet. and Gynec., Feb.' 25. See also H. Pritchard, B.M.J. i./28,794.

The preceding intravenous dose, or 15 Cc. of 25% intramuscularly, repeated at intervals of 2 hours.—B.M.J.E. i./30,63.

5 to 10 Cc. of 25% solution intramuscularly after each convulsion, until controlled. It is not used in coma. Give colonic irrigation, wash out stomach, and leave 60 Cc. saturated solution Magnesium Sulphate in it. Then inject 1,000 Cc. 20% Dextrose solution during 30—50 minutes 2, 3, or 4 times daily. When stomach has emptied itself, inject 5% Syrup water, beginning with 50 Cc. and increasing hourly up to patient's tolerance, possibly up to 300 Cc. an hour, until patient is conscious.—O. H. Schwarz, Jl. A.M.A. ii./29,1679.

EPILEPSY.—1 Cc. of 1 in 5 Solution or 1 Cc. of 1 in 2 Magnesium Chloride hypodermically has been used.

HEADACHE, *e.g.* post-concussional, 4 to 8 oz. 50% Magnesium Sulphate solution per rectum.—A. Feiling, B.M.J. ii./30,907.

HYPOPYON ULCERS treated with Magnesium Sulphate Lotion—up to saturated solution. Encouraging.—D. Matheson Mackay, B.M.J. ii./21,738. See also M. Kirkpatrick, per T. D. B., Aug. 15, 1921, p. 83.

LIVER CHANGES due to Carbon Tetrachloride or to destruction of schistosomes of great value in treatment.—F. G. Cawston, Pr. Apl. '31,467.

MENTAL CASES. 2 Cc. of 50% solution injected as sedative. In 82·7% of cases the action was prompt, the patient becoming quiet in 13 to 30 minutes and then sleeping from 5 to 7 hours.—M.P.C. i./23,291.

RHEUMATISM. Injected into the buttock and infra-scapular region. *Dose* —4 Cc. of 25% Solution daily for the first three or four days and then alternate days.—P.J. i./12,124. 3 grain doses hypodermically purge and relieve.—L. ii./11,481. Hot saturated solution on gauze on the limbs also effective.

RODENT ULCER of the face healed after 5 injections of Magnesium Sulphate. —R. W. Moir, per Pres., June, '23,237.

A solution of 35 grains to the ounce useful as lotion in lymphangitis, erysipelas, cellulitis, orchitis, epididymitis and all vague œdemas and swellings.—B.M.J. i./16,400.

SCALDS AND BURNS well treated by a concentrated (25% and over) solution. S. J. Meltzer, Jl. Pharm. & Exp. Therap., Nov., 1918.

TETANUS has been treated by spinal, intracerebral and subcutaneous injection—the usual dose being 1 to 5 Cc. of 25% solution. Calcium Chloride is an antidote to Magnesium Sulphate—an injection of 5 Cc. of 5% solution counteracts the effects almost instantaneously. The method was not found of service by our W. O. authorities. Intraspinally it is an anticonvulsant, but it may be better to use dilute solution in large amounts—a pint to a quart of 1 to 2% solution at intervals by hypodermoclysis.

TROPICAL ULCER treated with wet dressings of Magnesium Sulphate 25% solution.—J. F. James, I.M.G., June, '25,274.

ULCERS of the leg treated by soaks of 5 to 10% Magnesium Sulphate solution —J. H. Young, L. i./29,976.

URÆMIA successfully treated by slow intravenous infusion of a 1% solution (2 Gm. $MgSO_4+7H_2O$ in 100 Cc. Distilled Water). Indicated with blood pressure rises above 130 mm.—C. B. Watson, B.M.J. ii./31,1086.

Death following ingestion of 57 Gm. Care should be exercised as toxicity may result without death—idiosyncrasy may exist and the average dose may be toxic. If toxicity does occur use Calcium salts subcutaneously or intravenously.—H. S. Thatcher, Jl. A.M.A. ii./28,1185.

Magnesium Sulphate Cream.

Mix together exsiccated Magnesium Sulphate 1½ lbs. with 11 ounces of Glycerole of Carbolic Acid (1 in 10) in a hot mortar to make a cream. (The carbolic acid may, however, be omitted.) Pack and thickly cover the wound with the cream. The dressing of gauze and wool is left unchanged for 3 to 8 days. Profuse discharge of serum takes place, so that more wool may be wanted. After a few dressings like this Magnesium Sulphate *solution* is used. Good osmotic action and inhibitory effect on the aerobic and anaerobic organisms.—A. E. Morison, B.M.J. i./18,342.

Our method found of service.—A. J. Coulthard, P.J.i./30,643.

As a **Granular Effervescent** preparation. *Dose.*—½ to 1 ounce (**15 to 30 Gm.**), or 1 to 3 drachms (**4 to 12 Gm.**) repeated, Magnesium Sulphate is frequently more effective, and more palatable.

'Vescettes' of Magnesium Sulphate, each containing 30 grains. To be crushed and dissolved in a small draught of warm water.

Mistura Alba. *Dose.*—½ to 2 ounces.

Magnesium Sulphate 30 grains, Magnesium Carbonate 15 grains, and Peppermint Water 1 ounce. A mild aperient.

Magnesii Sulphas Exsiccatus.—If crystallised Magnesium Sulphate be heated at 100° C. it will lose 37—40% moisture. It is a fine white powder without odour with a saline bitter taste, giving a warm sensation to the tongue due to its recombining with water. Almost completely soluble in water. Aqueous solution (1 in 40) should be neutral to litmus paper.

Enema Magnesii Sulphatis. ½ to 2 ounces in ½ to 1 pint of water.

Magnesii Sulphis, *v.* p. 86.

Grignard Reaction, Mechanism of.—J.C.S.A. i./20,30.

MALTUM.

Maltum. Grain of barley partially germinated artificially and then dried. Yields 70% extract. The acidity calculated as lactic acid should not exceed 0·3%. It should not contain more than 1/100 grain Arsenic, calculated as Arsenious Oxide, to the pound.

Maltum F.E. VIII. has *Syn.* Cebada Germinada.

Malti Pulvis. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

Malt flour or entire malt powdered, is added to baked wheaten flour in various proportions to form the popular infants' foods, and is given to assist digestion. When these are mixed with hot water or a mixture of hot milk and water, the starch contained in the wheaten flour becomes soluble and digested into dextrin and malt sugar. The diastasic property of malt is most active in aqueous solution at 104° F.,—a boiling heat destroys it. A small teaspoonful of malt flour may be sprinkled over or mixed with cooked farinaceous foods, coffee, beer, &c.

Diastase. Obtained by exhausting malt with tepid water, precipitating with alcohol, and drying at below 45° C. Is a yellowish white powder or in translucent scales. According to Fr. Cx. diastase converts 100 times its weight of starch into sugar and dextrin. Its use is indicated by the presence of starch grains in the fæces or urine.

Extractum Malti.—*Syn.* Extractum Bynes, Extrait d'Orges.
Dose.—1 to 4 drachms.

A brownish semi-liquid substance Sp. Gr. about 1·400, with pleasant sweet taste, consisting principally of maltose (about 50%), with dextrin, dextrose, diastase, proteid, phosphates and aromatic principles. It is made by mixing malt with tepid water (55° C., *i.e.*, 131° F.), pressing, filtering, and evaporating *in vacuo* at below 55° C. Extract of Malt and its preparations are prescribed in cases of debility of all kinds, as a restorative, like cod liver oil, but particularly where digestion is weak. It should digest twice its weight of arrowroot starch in 30 minutes at 40° C. (B.P.C., 1901).

National Mark (Pharmaceutical) Malt Extract.

Under the **Agricultural Produce (Grading and Marking) Act, 1928,** and the Malt and Flour and Malt Extract Regulations, 1929, All-English Pharmaceutical Malt Extract is prescribed (with a label, *mainly blue*) made from home-grown barley. Sp.Gr. must be not less than 1·4, and soluble protein content at least 5% of the total weight. A Lintner value of 25 (method of determining is given) is the prescribed minimum for Diastase. When sold in conjunction with Cod Liver Oil, the mixture must contain 15% of oil.—*Ministry of Agriculture and Fisheries Marketing Leaflet, No.* 14, B.M.J. ii./29, 1065: L. i./30,271, ii./30,672.

Determination of activity.—H. L. Hind, P.J. ii./31,363.

Further on assay and adulterants, Vol. II.

F. E. VIII. incorporates 10% of Glycerin and the finished product must digest five times its weight of potato starch at 40° C.

Incompatibility. A few years ago we determined the compatibility or incompatibility of numerous Soluble Chemicals with Malt Diastase. Broadly speaking, the following are incompatible: Acids, various Inorganic and Organic, also Acid Preparations, Ferric Chloride, Pepsin Preparations, Potassium Permanganate. *In Vol. II. we provide further details. Cf. also* 'Enzyme Action.' A mixture of Hydrogen Peroxide and Ferrous Sulphate can liquefy starch similarly to an enzyme.

***Radio-Malt.** (T.M. 468864,476361,468643,476362). A Malt Extract preparation to replace Cod Liver Oil containing Vitamins A, B and D, the latter in the form of ***Radiostol** (T.M. 477932) produced by irradiating Ergosterol with ultra-violet rays. (See also Radiostoleum and Radiomulsin.)

The Vitamin content of the preparation is stated to be greater than that of Cod Liver Oil and Malt Extract, and to be standardised physiologically. It is agreeable in flavour, while the Cod Liver Oil preparation is objected to by many.

The undiluted Radiostol possesses 200,000 times the antirachitic activity of Cod Liver Oil, one sixth of an ounce equalling a ton.

***Maltaffin.** (T.M. 355917)—*Martindale.*

Dose.—One to two teaspoonsful at bedtime. Children, half t one teaspoonful, increased if necessary.

A combination of Liquid Hydrocarbon Oil with Malt Extract as a electuary. Suitable for children. The oily taste is largely masked

Maltaffin is also made with **Hypophosphites**, with **Cascara**, wit **Iron**, with **Glycerophosphates**, and with **Quinine** and **Strychnine.**

***Maltine** (T.M. 15025, 40301 & 456193) is a Trade Mark Brand of Mal Extract. **Malt Diastase** (*antea*) in France is called Maltine.

***Diamalt** (T.M. 487573, 269671 & 296716) is stated to have diastasic powe 1060—(1392 elsewhere)—higher than many of the Malt Extracts on the market Digested seven times its weight of starch at body temperature.—L. i./09,551

Extractum Malti Liquidum.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

In place of evaporating malt infusion to the viscosity of the solic extract, if it be concentrated *in vacuo* to prevent decomposition of th ferment diastase until it has Sp. Gr. 1·375, and about 7% of alcoho added, making the finished product of Sp. Gr. 1·250, a liquid extrac is formed which is more convenient.

Glycerin is added ; Alcohol alone precipitates the diastase.—P.J. ii./07,732

***Bynin** (T.M. 41136 and 41137). A proprietary brand of Liquic Malt Ext.

Ⓟ ***Bynin Amara.** *Dose.*—2 to 4 drachms well diluted.

Contains Quinine Phosphate 1½ grains, Iron Phosphate 2 grains Strychnine Phosphate $\frac{1}{16}$ grain, in liquid malt extract (Bynin) 1 ounce It is ¼ the strength of Easton's Syrup.

Extractum Malti cum Hypophosphitibus.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Dissolve Calcium Hypo phosphite 0·5 in water 4, and Sodium Hypophosphite 0·5 in water 1, then add Liquid Extract of Malt *q.s.* to 100.

Extractum Malti cum Cascara.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Liquid Extract of Cascara 1, Liquid Extract of Malt 7. This is palatable. Mix and mark ' Shake."

Extractum Malti Ferratum, G. H., E.

Iron Pyrophosphate 2, Water 3. Dissolve and add Extract of Malt 95. *Dose.*—1 to 4 drachms (**4 to 15 Gm.**).

Extractum Malti cum Hæmoglobin.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).—Hæmoglobin 1, Liquid Extract of Malt 7. Mix and mark ' Shake.'

Extractum Malti cum Syrupo Ferri Phosphatis. *Syn.* MALTO-FERROSE. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

Each drachm contains: Phosphates of Iron ¼ grain, and of Calcium ½ grain, with ¼ grain each of Sodium and Potassium Phosphates.

Extractum Malti cum Oleo Morrhuæ. *Dose.*—1 to 4 drachms.

This preparation should contain at least 15% Cod Liver Oil.

National Mark All-English (Pharmaceutical) Malt Extract with Cod Liver Oil.

Under the **Agricultural Produce (Grading and Marketing) Act, 1928**, and the Malt and Flour and Malt Extract Regulations, 1929, All-English Malt Extract of the quality prescribed (*q.v.*) may be mixed with not less than 15% by volume of Cod Liver Oil of B.P. quality with permissible variation of 1%.—L. ii./30,672.

Extractum Malti cum Pancreatina. *Dose.*—1 to 4 drachms **(4 to 15 Cc.)**. Liquid Extract of Malt 2, Pancreatic Solution 1.

We find this produces a perfectly clear solution without any deposit : on the other hand, made with Pancreatin 2, Glycerin 10, and Liquid Extract of Malt to 100, the result was not satisfactory. Assists digestion of farinaceous food.

***Bronamalt** (T.M. 349714, Cl. 42) (previously known as Vibrona Malt).

Dose.—1 to 2 drachms with or immediately after meals.

Described as a tonic food. A combination of a hydrobromic Extract of Cinchona with a liquid Malt. In cases of impaired nutrition and loss of appetite, especially in children.

***Lacto Maltine** (T.M. 156408 Class 42).

Dose.—One dessert-spoonful after meals in tea, coffee, milk, wine or farinaceous food.

A preparation rich in milk-fat, easily digested. The diastasic ferment acts as an adjunct where there is feeble carbohydrate digestion.

Extractum Malti Siccum.

Contains about 75% Maltose, 1·5% Phosphates, 5% Albuminoids. *Dose.*—1 to 2 drachms.

A somewhat hygroscopic yellowish coarse powder, easily soluble in water. Is desiccated *in vacuo* and keeps well.

In some experiments, we found British Dried Malt Extract to be more active than foreign, but not quite so active as Extractum Malti.

Dry Malt Extract with 50% Paraffin.

Dose.—Infants, one teaspoonful dissolved in slightly warmed milk feed three times a day. Children, two teaspoonsful two or three times a day. Adults, one tablespoonful three or four times daily. Best taken just before or after meals.

This has the appearance of a crystalline compound. It emulsifies with water.—L. i./15,918.

***Taka Diastase.** *Dose.*—1 to 5 grains **(0·06 to 0·3 Gm.)**.

***Taka** (T.M. 286557, Class 42). Diastase, Koji, Moyashi—all being ferments and converting agents—included. Originally taken out by Takamine. Assigned to Int. Takamine Ferment Co., Broadway, N.Y.

A whitish powder obtained by the cultivation of a fungus, *Eurotium Oryzæ*, on bran ; possesses amylolytic properties.

Useful for gouty dyspepsia and hyperacidity of the stomach.

Taka Diastase in 5 grain Capsules after each meal and at bedtime improves diabetes mellitus,—amount of urine and sugar content lessened.—L. i./11,826.

Mead's Dextri-Maltose. A powder containing 51% Maltose, 42% Dextrin and 5% Water and at choice, salt free, or containing 2% Sodium Chloride or Potassium Bicarbonate 3%. No. 1 (with salt) is for infant feeding, No. 3 (with Potassium Bicarbonate) for infants who suffer from constipation. No. 2 (salt free) for use by practitioners who prefer to make their own salt additions.—L. ii./22,520.

MANGANESIUM. (*See also* p. 369).

Mn = 54·93.

Manganesii Butyras. $Mn[C_3H_7COO]_2$=229·0392.

Dose.—1 to 1·5 Cc. of 1% solution intramuscularly—not more than 3 injections should be given with 3 or 4 days' clear interval between them.

Preparation.—Manganese Butyrate is precipitated as a heavy oily liquid by interaction of solutions of Sodium Butyrate and Manganese Chloride. This oil is washed with water, dried over Sulphuric Acid, and then washed with Ether to remove free butyric acid. The product is again dried over Sulphuric Acid for some days, and powdered.

Characters.—Pale pink powder having only a slight odour of Butyric Acid. Dissolves in about 6 parts of cold water. The substance is hydrolised by boiling water with deposition of Manganese Hydroxide.—According to our experiments, 1923.

Uses.—Boils, carbuncles, erysipelas, whitlows, lymphangitis, lymphadenitis, gonococcal urethritis and abscess formation said to be well treated by Manganese Butyrate Solution (1%).

Should be used prior to making incisions in septic lesions. Two injections should cause the lesion to abort if no pus has formed and if pus has formed, the part will come to a head ; then use a dry dressing.—M.P.C., Dec. 20/22.

In gonorrhœa, the drug 'par excellence.' Intramuscularly into the buttocks on the first and fifth day of the discharge, in doses of 1 Cc. and 1·5 Cc. of 1% solution. Results extremely gratifying, the acute stage of the disease being materially lessened. Only two injections should be given.—J. J. Abraham, L. i./24,1224.

Staphylococcal and Streptococcal infections better treated than gonorrhœal. It will ward off an attack of rhinitis, influenza, and other infections, providing it is used early. Also used in dermatitis, asthma, and urticaria.—*See also* J. E. R. McDonagh, B.M.J. i./25,655.

Miners' Boils and Carbuncles. Manganese injections recommended.—S. W. Fisher, L. i./31,750.

Vascular Hypertension and Hypotension.—Hypertension and hypotension are stated to be caused by changes in the nature of the protein particles of the plasma.

Hypertension is a result of the protein particles leaving the colloidal state and forming true solutions, and is found in cases of chemical intoxication, in some cases of syphilis and diabetes, in pregnancy and at the menopause, and is the natural sequence of old age. The best remedy for acute cases is the injection of 1% Manganese Butyrate solution in doses of 1·0, 1·5, 2·0 Cc. at five day intervals. In chronic cases, Insulin 20 units is a suitable drug. With all these methods the course may have to be repeated.—J. E. R. McDonagh, M.P.C., Jan. 23 & 30/1924.

Manganese Butyrate Sterules. 1, 1·5 and 2 Cc. of 1% solution are made.

Manganese Butyrate Solution 1%, 1 Cc. with Sodium Thiosulphate 0·03 Gm. in water 1 Cc. R. B. Billimoria tells us the addition of the Thiosulphate reduces the pain of the Butyrate on injection. Lymphangitis (septic streptococcic), streptococcic and staphylococcic boils, and septic pulmonary tuberculosis cases have been treated.

Trimine. *Dose.*—8 to 15 minims (**0·5 to 1 Cc.**). A Colloidal Manganese containing Colloidal Iron and a trace of Colloidal Zinc in addition. Advised in conjunction with Colloidal Palladium in treatment of gonorrhœa and complications.—J. E. R. McDonagh, Pr. January, 1920.

Manganesii Chloridum. $MnCl_2+4H_2O$=197·9064.

Rose coloured deliquescent crystals.

Dementia præcox (but not cases with active organic disease) treated by 30 half-weekly injections intravenously of from 2 to 8 Cc. of a 0·02% solution : then 0·3 Gm. Manganese Chloride *per os* twice daily for a month. Improves physical condition, but optimum intravenous dose should not be exceeded.—G. E. Reed, Can. Med. Ass. Jl., per M.A. '31,316.

Manganesii Citras, 'Soluble.' *Dose.*—3 to 5 grains (**0·2 to 0·3 Gm.**). This, a double salt with Sodium Citrate, and **Ferro-Manganese Phosphate**—*Dose.*—3 to 10 grains (**0·2 to 0·6 Gm.**)—are scale preparations.

Manganesii Hypophosphis, $MnP_2H_4O_4+H_2O=203·0168$. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).

A white or slightly rose-tinted powder, soluble 1 in 10 of water. A nerve stimulant.

Manganesii Oxidum Præcipitatum.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). or more, in pills with syrup. Tablets, 2 grains (**0·12 Gm.**).

Manufactured from Manganese Sulphate by action of Ammonia and Hydrogen Peroxide.

Consists principally of Manganese Di-oxide $MnO_2=86·83$, a bulky blackish brown powder, free from grittiness and entirely soluble in cold hydrochloric acid.

Uses.—In gastrodynia, pyrosis, and in amenorrhœa taken 3 or 4 times a day before expected period. In chlorosis it assists the action of iron salts, and is less irritant than the permanganates.

Manganesii Phosphas, $Mn_3P_2O_8.7H_2O=480·9392$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A white powder, generally with a pinkish tint, insoluble in water. From $\frac{1}{2}$ to 1 grain is given in 1 drachm of syrup of ferrous phosphate

Manganesii Sulphas. *Syn.* MANGANI SULPHAS, SULFATO DE MANGANESO, F.E. VIII. $MnSO_4+4H_2O=223·0524$.

Dose, of powder, 2 to 10 grains (**0·12 to 0·6 Gm.**).

A white powder with a faint pink tint, due to a little manganic sulphate, or in pink crystals. ***Soluble*** about 1 in $1\frac{1}{2}$ water. For jaundice 60 grains is a cholagogue purgative ; not reliable, may cause sickness.

Potassii Permanganas. $K_2Mn_2O_8=316·06$. (*B.P.* '14.)

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) in well-diluted solution, or in pill. **Capsules** contain 1 grain (**0·06 Gm.**).

Manufacture.—May be prepared by oxidising Manganese Dioxide by the aid of Potassium Chlorate in the presence of Potassium Hydroxide. Electrochemical method. By oxidation of the Manganate in an electrolyser. Surrounding the anode is a solution of Alkali and round the cathode is a solution obtained by lixiviating the melt of Manganese Dioxide and Potassium Hydroxide (Manganate). Dichromates, Perchlorates and Persulphates can be made similarly.—P.J. i./16,3.

Incompatible with all vegetable oxidisable matter, *e.g.*, glycerin, alcohol, sugar, fats and oils, with ammonia, ammonium salts and alkaloids.

Poisoning by 15 to 20 Gm. dissolved in water : was treated both by lavage and internally with a cardiac tonic—a digitalis preparation—and also with Magnesia as the presence of hydrochloric acid was alleged. The Potassium had probably produced the toxic symptoms on the heart. *Recovery.*—L. ii./11,907.

Uses.—The **Saturated Solution** (1 in 20 of water) is strongly bactericidal, as a disinfectant its colour is an advantage. Even 1 in 1,000 is efficient *cf.* Vol II. It is a good deodoriser.

A dilute solution will dye white hair to a chestnut brown, but this cannot be advised.

Gargle, Mouth Wash, or Vaginal Injection 1 of Potassium Permanganate in 5,000 of water is useful.

The solution is very nauseous to the taste. Useful for applying to foul ulcers and patches of gangrene, and to carbuncles as mild caustic.

References.

AMENORRHŒA. 1 or 2 grains, in a pill 3 or 4 times a day shou be given for a few days before the time of the expected period.

Also of great value in the blae type of young women—florid, not anæm readily tired—pulverettes 2 gr., three times a day after meals.—E. K. Ma kenzie, B.M.J. i./25,530.

For GONORRHŒA 1 in 10,000 to 1 in 1,000 is used as a warm ir gation or injection.

Injectio Potassii Permanganatis, L.H., has 5 grains in 1 pint, *i* 1 in 1,600 in round numbers.

It is as good (1 in 1,000 solution) as silver preparations. In place injection, irrigation (JANET'S METHOD) is often used. In cases se early, before acute inflammatory symptoms and purulent discharg have appeared, abortive treatment is sometimes successful, but n likely to succeed after 24 hours. This consists of irrigation of t anterior part of the urethra with this solution.—C. F. Marsha

Irrigation with Permanganate for gonorrhœa in the War—no defini strength adhered to, as the urethra gradually acquires toleration to it.— E. T. Burke, L. i./17,756.

GONORRHŒAL CONJUNCTIVITIS in the adult treated by prolonged uni termittent stream of 1 in 15,000 to 1 in 20,000 solution.—L. i./12,91.

GONOCOCCAL STOMATITIS. Urethral irrigation with 1 in 8,000 Permanganat eyes with 1 in 5,000 Mercury Oxycyanide and 20% Argyrol Drops : mouth wa 1 in 5,000 Permanganate. Vaccine. Edwenil.—A. D. Frazer and J. Ment B.M.J. i./31,1020.

BREATH, OFFENSIVE.—1 or 2 grains in a glass of soda water taken on empty stomach is a certain cure.

BROMIDROSIS.—Wash the feet first in benzene, then in 1% permangana (at night). Powder (during the day) with Potassium Permanganate 1 Alum 1, Talc 50, Zinc Oxide 18, Zinc Chloride 18. Bath of borax and benzo also useful.

CHOLERA treated by 2 grains of Potassium Permanganate every ¼ hour f 2 hours, then 1 pill every ½ hour. These are continued until the stools beco green and less copious—this is usually attained in 12 to 24 hours. A we solution (1 to 6 grains per pint) of Calcium Permanganate is allowed as a drin 50 grains of permanganates by the mouth in 24 hours have been given witho harm, and even larger doses would probably be tolerated—in addition hype tonic saline injections (*q.v.*).—B.M.J. i./11,760. **Rectal Injections** 4 grai to the pint have also been used.

DERMATITIS among painters, following use of paint solvents, cured in days by 1 : 1,000 solution Potassium Permanganate.—J. A. Turner, Jl. Indus Hyg., July '25,293 ; Per Pres., Oct. '26,351.

DYSENTERY, ASYLUM.—A solution of Permanganate, 1 grain in 20 ounce is used. The patient swallows ½ to 1 or 2 ounces several times a day. urgent cases, 20 m. approx. injected deeply into the buttocks—results oft remarkable.—W. J. A. Erskine, B.M.J. i./25,530.

EPIDERMOPHYTOSIS, INTERTRIGO, ECZEMA MARGINATUM and eczematoid rin worm well treated by solution 1 in 5,000 gradually increased.—S. Feldma and B. F. Ochs. per Jl. Trop. Med., June 1/23,198.

LUPUS nodules have been treated by applying saturated solution or boring holes with wooden skewer, filling with permanganate and moistening t surface with water and repeating a few hours later, using novocain and adrenali

OZŒNA. A spray of the Liquor 5 minims with Sodium Chloride 5 grains the ounce of water is useful.—H. Tilley.

PNEUMONIA *see* ***Thyroid and Manganese*** *postea.*

PYODERMIA well treated with baths containing Potassium Permanganat Copper or Zinc Sulphate or Sublimate.—B.M.J.E. ii./25,80.

SLOUGHING and TETANUS-INFECTED WOUNDS, according to Sir Leona Rogers, may be well treated with not less than 1 in 500 Potassium Perma ganate Solution.

SMALLPOX.—Potassium Permanganate in saturated solution (5%), useful for painting the body. If skin sensitive, use 1·5%. In confluent cases patient put in a bath of this 5% solution, at body temperature, for 10 minutes. Reduces smell and sloughing.—L. ii./22,1193.

STYPTIC FOR SEROUS SURFACES.—In cases of hæmorrhage from superficial wounds of these surfaces after separation at adhesions, a few crystals applied in a fold of lint—or muslin—with forceps causes blood coagulation. Bleeding stops at once. Oxygen is evolved.—J. Dsirne, L. i./21,1380.

TUBERCULOUS FISTULÆ and dactylitis have been treated by packing with the crystals twice a week.

TUBERCULOUS ULCERS yield to Potassium Permanganate 1 drachm to the ounce, followed by Starch Iodide.

The immediate application of a solution of Permanganate 1 in 1,000 will prevent the occurrence of VENEREAL DISEASE.—H. Wansey Bayley, B.M.J. i./21,33. Its evils, *ibid* 66.

VARICELLA treated by Potassium Permanganate baths, 5 to 6 Gm. for an adult or half the amount for children.—B.M.J.E. ii./25,80.

VOMITING OF PREGNANCY has been treated by 2 to 4 grains Potassium Permanganate in a cachet, giving immediately afterwards 3 to 4 ounces of water. Patient keeps this in the stomach 10 to 20 minutes—lying very still—then a pint or more of warm water. If necessary a further 1 grain of Permanganate per hour.

WAR WOUNDS have been treated by the powdered permanganate.

Thyroid and Manganese Treatment in Acute Pneumonia.

ACUTE INFECTIONS, JOINT DISEASES, HEART DISEASE, ABNORMAL BLOOD PRESSURE, DISEASES OF PREGNANCY, DISORDERS OF METABOLISM, DIGESTIVE TROUBLES, NERVE COMPLAINTS, PULMONARY DISEASES, DISEASES OF THE SKIN, GOITRE AND MYXŒDEMA, DISEASE OF THE BREAST, ETC., treated by rectal injections of Potassium Permanganate 1 grain in 1½ pints of sterile warm water. The amount is varied according to case, *e.g.*, 2 doses of ¼ pint may be found more effective than 1 dose of ½ pint. Warn patients they may feel some pain in the epigastrium within a few minutes, also they may pass long white skins or strings of mucus in the stools. **Thyroid** is given simultaneously—1 grain twice daily, but doses of 6½ grains or 5 or 10 grains are in some cases desirable. Sometimes the Permanganate may be used *per os*, in cachet, followed by a large draught of water, but this is not so good.—H. W. Nott, B.M.J. i./25,443 ; ii./25,1209.

PNEUMONIA.—Remarkable results. It is suggested that Permanganate may be a specific. Treatment consists in rectal injections of 3-10 ounces of a Potassium Permanganate solution (4 grains in 3 pints) every 2 or 4 hours. —H. W. Nott, B.M.J. ii./26,109. Basic principles underlying the treatment.—H. W. Nott, B.M.J. i./28,94. *See also* B.M.J.E. ii./29,43.

Value of treatment confirmed in 5 consecutive cases of acute pneumonia.—N. J. Roche, B.M.J. i./27, 459. *See also* B.M.J. i./27,539.

The distribution of Manganese in the animal and in foods. The combination of Thyroid with Manganese may have a physiological basis of much significance. —B.M.J. i./25,468.

Further discussion on the effects. A point regarding casts caused by action of the alkali formed.—J. S. Kellett Smith, B.M.J. i./25,678.

A combined cachet of Potassium Permanganate and Thyroid gives effects in cases of neurasthenia accompanied by low blood pressure, not obtained by giving the two separately. The Thyroxin is probably not destroyed by the Permanganate in this way. The therapeutic effect may be due to a new substance produced by the reaction of the two.—J. T. Blackie, P.J. i./26,231 ; C.D. 1./26,306.

A 1 in 7000 solution per rectum 4-hourly of value, even in debilitated children almost moribund ; in conjunction with antipneumococcus vaccine a good armamentarium.—A. A. Hearne, B.M.J. i./28,159. H. L. McCormick, *ibid* 377.

Snake bite lancets (Brunton's) are prepared containing the crystals.

Directions.—Squeeze the part so as to press out the venom, then cut with the lancet, making several incisions deeper than the bite, and rub in the dry crystals thoroughly, moistening with water if necessary. Tie a ligature or handkerchief

between the bite and the heart as soon as possible to prevent the venom getti into the circulatory system. Equally good in all kinds of snake bite.

If a tube of ethyl chloride is at hand spray the part whilst making incision

SCORPION STINGS are best treated by ammonia or an evaporating lotion the affected part, also Potassium Permanganate as in snake bite.—L. Brunto L. ii./15,200. A few drops of strong Permanganate solution injected rou the part.—A. S. Gubb, B.M.J. i./23,41.

A case of adder bite, treated with Potassium Permanganate Crystals, h rectal injections of Normal Saline, hypodermic of Strychnine and 10 Cc. Normal Horse Serum thrice daily—recovery.—B.M.J. i./12,420.

Bougies of Potassium Permanganate contain ½ grain (**0·03 Gm** in Theobroma Oil basis, 4 inches long.

Pilula Potassii Permanganatis. 1, 2, 3, 4 or 5 grains with Kaol Ointment, *q.s.*

Caution! Avoid mixing any easily oxidised substance, lik sugar, glycerin, etc. The pills may be coated with sandarach solutio

Tablets contain 1, 2 and 3 grains. To be dissolved.

Solubes 5 grains for preparing lotions and vaginal injection to be dissolved in ½ a pint or more of water.

Lotion 'Sterules' of Potassium Permanganate contain 8·75 grain 1 diluted to 1 pint produces a 1 in 1,000 solution.

Permanganate Tablets for purifying Drinking Water. (Laurent's.)

To each litre of water add Potassium Permanganate 0·03 Gm. and Powder Alum 0·06 Gm. After standing 5 minutes, if the solution is not pink a another tablet or two. Remove excess of Permanganate by Sodium Hyp sulphite 0·03 Gm. and dried Sodium Carbonate 0·06 Gm. After 10 minut pass through cotton wool. Ingredients may be in tablet form.—P.J. i./15,12

Calcii Permanganas. $Ca(MnO_4)_2+5H_2O=368·008$.

Dose.—¼ grain (**0·016 Gm.**) in **Pills** or **Capsules** (with Liqu Paraffin as vehicle) thrice daily one hour before meals.

Deliquescent crimson crystals preferred for making mouth lotion as it has less taste than the Potassium Salt. 1 in 100,000 sterilis water in 5 minutes; more powerful than the latter.

Uses.—Similar to the Potash Salt, *e.g.*, in cholera. Has be given in rodent ulcer, gastric ulcer and gastritis.

Calcium Lactate and Iodide found most effective in removing warts fr the hands. The use of Calcium Permanganate resulted in disappearance ulcers in several cases, removes offensive odour.—G. Arbour Stephens.

Sodii Permanganas. $Na_2Mn_2O_8=283·854$.

In solution, red in colour, is used as a cheap disinfectant. ✱**Condy Red Fluid** (Condy's & Condy's Fluid and Condy's Fluid Co. are covered a large number of Trade Marks, Class 2) is stated to be a mixture of the s phate and permanganate of soda.—H. R. Kenwood, L. i./26,1055. ✱**Cond Green Fluid** has Sodium Manganate $Na_2MnO_4=164·924$ in solution.

Zinci Permanganas. $Zn(MnO_4)_2+2H_2O=339·2712$.

Deliquescent brown crystals; for lotions and injections, 1 grain in 8 ounc (1 in 4,000), where the astringent action of the zinc is indicated. As an e wash 1 in 1,000 to 1 in 2,000. **Injectio Zinci Permanganatis, L.** (Urethral). Has ½ grain in 3 ounces (1 in 2,625).

For gonorrhœa excellent.—Campbell Williams.

For pyorrhœa alveolaris and oral sepsis as mouth wash it is ve useful.

'Collapsubes' with catheter attachment, of Zinc Permanganate in S Paraffin; strength 1 in 2,000 for use in chronic gonorrhœa.

Zinc Permanganate Bougies, 4 inches long, containing ½ grain (0·03 Gr in Theobroma Oil basis are prepared.

Manganese Poisoning—cases described.—Per Clin. Jl., May 16, '23,233.
Poisoning due to inhalation of dust while grinding the ore.—R. F. Gayle, Jl. A.M.A. ii./25,2008.

Manganese in Foodstuffs. It was thought that perhaps shell-fish, winkles, pickles, condiments, used to encourage a fading appetite, might contain more Manganese than other foods. It has been shown that Manganese salts are effective in producing experimental cirrhosis in rabbits. The guess was erroneous, but tea and cabbage contain a lot. A vegetarian tectotaler probably takes in more than a heavy drinker.—A. E. Boycott and G. R. Cameron, L. ii./30,959,1044.

MENTHOL.

Methyl-propyl-phenol Hexahydride. $C_{10}H_{20}O = 156 \cdot 156$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more in a pill with powdered soap, or in solution in olive oil.

A white crystalline substance deposited on cooling **Oil of Peppermint** *q.v.* Obtained from *Mentha arvensis, vars. piperascens et glabrata*, and *M. piperita* (*Labiatæ*), it melts at 42 to 43° C.

Soluble 5 in 1 of 90% Alcohol, also in Ether 2 in 1, Chloroform 4 in 1 approximately, 1 in 4 of Olive Oil, and in Petroleum Spirit 10 in 7. Sparingly soluble in water, insoluble in glycerin. Soluble on warming in a strong solution of Sodium Salicylate, but throws out again.

Uses.—Given internally, it acts as a diffusible stimulant. Of value in the vomiting of pregnancy and other forms. Its solutions, applied to the skin, affect the nerves of the part somewhat like aconite, and form useful pigments for headache, rheumatic pains and neuralgia. It has antiseptic and anæsthetic properties, and gives great relief in prurigo, urticaria and pruritus ani. It liquefies when gently rubbed on the painful part.

As an antineuralgic in toothache and for sciatica 1 in 60 of Alcohol with a little Clove Oil, is employed; also Menthol Cones. The crystals on cotton wool may be placed in the hollow of an aching tooth

Caution.—It is dangerous to apply an ointment containing Menthol to the nostrils of infants, *e.g.*, for treatment of catarrh,—may cause instant collapse.—*Cf.* Camphor.

Menthol liquefies with an equal amount of either Carbolic Acid, Chloral Hydrate or Thymol, also 3 parts of Menthol and 2 parts of Camphor, 2 parts of Menthol and 1 part of Butyl Chloral Hydrate, and 2 parts of Menthol, with 1 of each Phenol and Butyl Chloral Hydrate. These will relieve toothache. Its Camphor and Phenol combinations are used to medicate **oro-nasal 'Ozonic'** and other dry inhalers, and are most beneficial for arresting and curing colds, and relieving influenza and chest affections.

For the inhalation of hot medicated moist air the **'Portable Inhaler'** may be used *cf.* Creosote and other vapours.

Menthol—Camphor and other combinations, diluted with a heavy mineral oil, for spraying into the nares or in spirituous solution, inhaled as above, relieve swelling and irritability of nasal catarrh, contract capillary blood-vessels of mucous membrane, reduce swelling, relieve pain and fullness of head, arrest sneezing, check excessive discharge, and correct perverted secretion. *cf.* Nebulæ.

Aqua Mentholis. Menthol 1, Alcohol 15, Distilled Water 1,000.

Ⓟ**Menthophenol.** Menthol 3, Phenol 1. Useful as gargle 15 drops to the tumbler of water.

Menthol Plasters, 10 to 15% in a suitable basis (Ⓟ if Lea basis) are useful for rheumatism and intercostal neuralgia.

Injectio Mentholis.

Menthol 0·5, Liquid Paraffin 100. For use with an Eustachia catheter to the middle ear.

Insufflatio Mentholis. Menthol 1, Ammonium Chloride 3, Bor Acid 2, and Lycopodium 6, relieves nasal catarrh.

℞℘1**Insufflatio Menthol et Cocainæ R.F.H.** Menthol 3 grain Cocaine Hydrochloride ½ grain, Boric Acid Powder ½ ounce, Bismut Carbonate ½ ounce.

℞℘1**Pulvis Mentholis et Cocainæ Compositus.** *Syn.* POUDR CONTRE LE CORYZA. FR. CX. SUPP., 1920.

Menthol 1, Cocaine Hydrochloride 0·5, Bismuth Salicylate 4. Boric Acid 50·5.

Ⓟ**Linimentum Mentholis.**

Menthol 3, Chloroform 4, Olive Oil *q.s.* to 16 ; is useful in lumbag neuralgia, sciatica, and ringworm.

℘1**Linimentum Mentholis Compositum.**—S. H.

Menthol 2, Aconite Liniment 1, Chloroform 4, Soap Liniment to 3

In pruritus, Menthol 1, Camphorated Alcohol, Chloroform an Ether of each 3 " dabbed on " lessens irritation.

Menthol-Paraffin Capsules contain a 1% solution of Menthol i Liquid Paraffin. These have elongated ends, which can be tor off, and the contents dropped into the ear to relieve earache.

Mentholeate. Menthol and Oleic Acid *p. æquales.* Heat gently t dissolve. Useful in pruritus, etc., where absorption is desired.

Linctus Mentholis.—Vic. Park.

Menthol 1/16 grain, Glycerin 8 minims, Cherry Laurel Water 10 minim Alcohol 90% 12 minims, water to 1 drachm.

Pastillus Mentholis, T.H., contains ⅙ grain.

Pigmentum Mentholis.—1 to Olive Oil 4. Painted or injecte into the larynx, or even the trachea, useful in phthisis, and laryn geal disease. Also applied on wool for ear affections.

Nebula Mentholis, 0·5 to 2% in Liquid Paraffin or Olive Oil is used fo spray or pigment for throat. Relieves acute laryngitis.—Tilley

Vapor Mentholis Citriodoratus.

Menthol, Eucalyptus Oil (from variety E. *Citriodora*), Eau d Cologne, and Alcohol 90% of each, equal parts.

A little inhaled, *e.g.*, from an Ozonic Inhaler or the handkerchief is valuable for nasal catarrh and influenza.

Unguentum Mentholis (3%) **et Camphoræ** (2%). Hay feve is well treated with, applied to the nasal passages in small quantity

Pigmentum Mentholis cum Guaiacol. Menthol 1 grain, Guaiacc in crystals 1 grain, Oil of Almonds to 1 ounce.

In acute tonsillitis, brushing with Menthol and Guaiacol (10% Menthol and 3 or 4% Guaiacol in Olive Oil) often has a good effect.— Dundas Grant, Pr. Mar. 1912.

Tabellæ Mentholis. *Dose.*—1 or 2, *ad libitum.*
Contain $\frac{1}{5}$ grain menthol, combined with chocolate.

Pilula Mentholis. $\frac{1}{2}$ to 2 grains, Mass with Powdered Soap or half its weight of White Wax previously *just* melted.

℗ **Tinctura Menthol Ætherea,** for local application.
Menthol 1, Purified Ether 4, and Chloroform 4. In neuralgia.

Gossypium Mentholis. 10%. Saturate Cotton Wool 85 with Menthol 10 and Liquid Paraffin 5 in Ether 265 and spread out to dry. Useful to plug the nose in nasal catarrh.

Menthyl Valerianate. ✱Validol. *Dose.*—10 to 15 minims (**0·6 to 1 Cc.**). Trade Mark 216165. Patent 3706/1896 now ***void.***
The specification contained in the patent method is so exceedingly vague as to lead one to assume that this is not a definite compound.
It is admitted to be a mixture of Menthol and Menthol Valerianate. Commercially we find the preparation apparently a solution containing about 25%. menthol in Menthyl Valerianate. To make true Menthol Valerianate one would proceed by the customary methods of producing esters, *e.g.*:—
(1) Valerianyl Chloride to interact with Menthol with the application of heat; or (2) The passage of dry gaseous Hydrochloric Acid into a mixture of Menthol and Valerianic Acid in equivalent quantities to saturation point—the mixture being heated with reflux condenser during the process.
The product to be finally washed free of Hydrochloric Acid.
A colourless liquid with agreeable odour and free from burning taste of menthol. Nerve sedative. Used in sea-sickness.

Synthetic Menthol (the subject of several patents), as distinct from the *B.P.* '14 Menthol is an optically *inactive* isomer. Its B.pt. is about 214—215°. Its M.pt., when quite pure, 34° (Natural Menthol 43°). Commercially the synthetic type is supplied with M.pt. about 30° as it contains a small quantity of an *iso*-menthol. In other respects the two are very similar in cooling effect, taste, smell, etc. Physiologically it is 2½ to 3 times more 'toxic' than the ordinary, but Menthol can hardly be so termed. Prolonged inhalation is said to be more poisonous than that of ordinary Menthol.—P.R., 1923,294; Y.B.P., '23,111.
The patented method consists in hydrogenating Thymol under pressure, using a Nickel catalyst. By agitating the liquid portion of the product with the next batch of hydrogenated Thymol an increased yield of crystalline substance is obtained.—P.R., '24,162. See also *ibid*, '24,277.
The synthesis of Thymol and Menthol from *p*-Cymene and 2-Cymidine. Patent specifications.—P.R., '24,316.
Inactive Menthol with M.pt. 35—36° said to be safe pharmacologically.—P.J. ii./27,176.

Ⓓ Ⓟ1 MORPHINA. Fr. Cx., F.E. VIII.

$C_{17}H_{17}NO(OH)_2,H_2O=303{\cdot}1718$.

Ⓓ *Morphine and Diamorphine (commonly known as Heroin) and their respective salts, preparations and substances containing not less than one-fifth per cent. (one part in five hundred) of anhydrous morphine or any proportion of diamorphine (except certain recognised formulæ). See also Opium and* 1925 *D.D.A.*

Ⓓ *Esters of Morphine and their respective salts, and any preparation, admixture, and extract containing any of them. Also Di-hydro-Morphinone (Syn. Dilaudid) its salts, and any preparation, admixture, extract, or other substance containing any proportion of it.* (Order in Council, 1930.)

The esters do not include and should not be confused with the *ethers*

of Morphine, *e.g.*, Methyl-Morphine (Codeine), and Ethyl-Morphine (Dionine) to which the Acts do *not* apply.—Home Secretary, P.J ii./29, 276.

The following is a useful explanation of the position relative to 'Esters' :—

Amendments to the D.D.A. (Aug. 15, '29) have revealed a certain amount of ambiguity in the scope of the Order in respect of Morphine derivatives (Esters and Ethers). An explanatory Memo. issued by the Home Office stated that the Order applied to Morphine derivatives known as ***Esters,*** and ***not to*** Morphine ***derivatives known as Ethers.*** The inference is that ***Morphine Esters*** are subject to the restrictions applying to ***Heroin*** & ***Codeine,*** which is a Mono-methyl-***ether*** derivative, and Peronine, a Benzyl derivative, are therefore ***excluded.*** The reason for this division is possibly due to the fact that ***Esters*** (*e.g.*, Heroin) as a class are unstable ***(easily hydrolised into components),*** and favour addiction whereas the Ethers (*e.g.*, Codeine), are comparatively stable and do not favour addiction.—J. Tait, P.J. ii./29,604.

Dose.—$\frac{1}{10}$ to $\frac{1}{3}$ grain (**0·006 to 0·02 Gm.**).

This, the principal alkaloid of opium, is in a white powder, or in white, shining crystals, ***Soluble*** in water about 1 in 5,000 slightly in ether and alcohol 90% ; glycerin 1 in 150, oleic acid 1 in 10 ; solutions of its salts are precipitated by ammonia and by potash (but re-dissolve in the latter). It loses about 6% of its weight on drying at 90° C., 3 parts of Morphine are reckoned approximately equal to 4 parts of the Acetate, Hydrochloride, or Sulphate.

Morphine was discovered by Sertürner in 1806, or possibly earlier by Derosne (1803).—B.M.J. i./21,59.

Morphine made on large scale at Darmstadt.—P.J. i./31,380.

Incompatibility.—Morphine salts are decomposed by alkalis and solutions are precipitated by vegetable compounds containing tannin, also with iron, lead, manganese, silver, copper, and zinc salts, liquor arsenicalis and potassium permanganate.

The alkalinity of glass bottles (especially colorless) may throw out a very appreciable amount of morphine from a solution of a salt.

Antidotes.—Emetics should first be given and the stomach tube used. Wash out the stomach with Potassium Permanganate Solution ; give strong hot coffee, or Ammonia, or Ether, Amyl Nitrite inhalation. Powdered Charcoal in Water *ad lib.* Physiological antidotes are Belladonna and Atropine. $\frac{1}{20}$ grain of the latter antagonises 1 grain Morphine (draw off the urine with catheter frequently). The following have also been given with good effect hypodermically :—Nitroglycerin, Picrotoxin, Pilocarpine, Strychnine. Oxygen inhalation, Saline solution intravenously and Brandy *per* rectum.

Potassium Permanganate as an oxidising antidote for many alkaloidal poisons. Should be used with stomach pump and emetics—more potent than physiological antidotes.

Morphine Suppository (1 grain) given in place of Glycerin—to infant 4 months, recovery under permanganate per rectum, and syphoned into the stomach.—B.M.J. i./12,724.

Atropine $\frac{3}{10}$ grain in doses of $\frac{1}{10}$ grain at intervals brought recovery where 4 grains of Morphine had been injected.—B.M.J. i./05,1040.

Opium Poisoning treated by Faradic current.—L. i./12,1120.

Opium and morphine may poison infants through the mother's milk.

Poisoning by apparently 7 grains of Morphine and $\frac{1}{6}$ grain Atropine (combined). Treatment.—Stomach washed out with Permanganate. Injections of Strychnine and bleeding. Death.—B.M.J. i./13,1271.

Morphine poisoning in a baby of 10 days (due to pre-anæsthetic injection of 1/48 grain Morphine) combated by a mixture of 10% Carbon Dioxide and 90% Oxygen. This mixture is known in the U.S.A. as 10–90.—J. R. McCurdy, Jl. A.M.A. i,/29,1927.

Flavoring of liquid preparations of Morphine.—Glyl Rosæ, Syl Amygdalæ Amaræ ; Syrupus Aurantii.

Uses of Morphine Salts.—A general and most useful sedative and anodyne for all purposes, preferably hypodermically, but may cause indigestion and constipation. Hæmoptysis is well treated by $\frac{1}{6}$ to $\frac{1}{2}$ grain hypodermically. Employed in diabetes, but Codeine generally preferred. May be given in renal cases.—For restless painful nights with cardiac dyspnœa. Give a small dose at first.

Acute uræmia occurring with a chronic parenchymatous nephritis cured by Morphine and Atropine. The urine was almost solid with albumin. Venesection and Oxygen also employed.—A. H. Carter, B.M.J. ii./12,1181.

Mania may be treated by $\frac{1}{2}$ grain dose with chloroform in addition. The two together produce deep sleep lasting several hours. Either alone is comparatively of little avail.

For children, contrary to usual opinion, experience showed that Morphine is well tolerated. It is preferable to the various Opium preparations. The initial dose is 1/10 milligramme per kilo of weight hypodermically. In children of 8 to 12 years 0·005 to 0·01 Gm. of Morphine Hydrochloride with Atropine was given.—P.J. ii./12,810.

Cardiac asthma, acute attacks. Morphine $\frac{1}{3}$ grain subcutaneously of great value.—Claude Wilson, L. ii./23,1346.

Whooping Cough cured by small doses of Morphine more speedily than by any other remedy.—B.M.J. i./25,1007.

Morphine acts only on certain ***pain centres in the brain*** and is therefore wasted in Lead and Opium Lotion and Laudanum fomentations. Rectal Morphine suppositories are efficacious only so far as Morphine is absorbed and carried to the brain. We are apt to fear the secondary effects of Morphine too much, rather than too little, and to forget that large doses of the synthetic products may cause sweating, rashes and sometimes cyanosis. —E. B. Leech, L. i./24,915.

May be given ***without fear of renal complications*** secondary to its use.—R. S. Ackley, Jl. A.M.A. i./30,79 ; L. i./30,364.

Intravenous Use.—

Coronary Thrombosis. Violent substernal pain treated by 1/8 grain Morphine and 1/120 grain Hyoscine—as salts—failed to yield, but 1/3 grain Morphine salt intravenously gave ***dramatic effect. It is not known whether Morphine salts intravenously are safe,*** but it was effective in this case.—F. Moor, L. ii./30,959.

In labour Morphine lessens the frequency of contractions, but pains pass off more slowly, so that the work done by the uterus is probably as great as, or greater than before, despite lessened frequency.—A. W. Bourne and J. H. Burn, B.M.J. ii./30,87.

Treatment of Drug Addiction.

In ***Morphine Habit*** Sparteine Sulphate has been used to replace the Morphine solution, commencing with $\frac{1}{2}$, increased to $\frac{2}{3}$ grain,

four to six times a day. Sodium Bromide and Nitroglycerin Tablets are useful, *q.v.* Camphor has been given to relieve the craving: also Heroin and Dionin.

For the insomnia Gamgee suggested Veronal, for the circulatory and respiratory troubles full doses of Digitalis Tincture, repeated hypodermic Strychnine ($\frac{1}{30}$ grain) injections. For the gastric catarrh Bismuth Carbonate (as much as 5 Gm.) first thing in the morning, with directions to change resting position as is done in treatment of gastric ulcer.

Turkish baths, heart tonics and Sodium Bicarbonate, *e.g.*, as Vichy Water with gradual weaning from the Morphine by the patient himself. With these exceptions, 'drugs,' especially hypnotics, should be little used. The habit can be "knocked out" in a relatively short time by Hyoscine and Atropine. Sparteine useful, also Bromide.—O. Jennings.

Morphinomania cured by Hyoscine. A severe case in which patient was taking 6 to 10 grains of Morphine Sulphate daily.—W. K. Anderson, Pr., June, 1912, per Pres., Oct., 1912, p. 255.

BERBERINE in dose of 0·1 to 0·2 Gm. in conjunction with Helenium has been used.

The sensations of Morphine (and cyanide) poisoning.—P.J. ii./22,218.

The morphinist is not a mental defective. Drug addiction does not lead to insanity or serious nervous diseases needing custodial care, but it makes the habitué more dangerous to society. It is not difficult to recognise drug addicts in society. Chief characteristics: plausibility and disorderliness. They lie for the sake of lying. They can work and write under the drug but disjointedly and in slovenly fashion.

15 *grains* of Morphine is an ordinary quantity for a morphinist to use in the 24 hours, though the same person will double this dose in case of any small imaginary trouble. The addict will probably never give information leading to disclosure of his source of supply. Results of withdrawal are described. Difficulties of treatment. The temperance is dependance on self control, not on control by others.—W. E. Dixon, B.M.J. ii./21,821. *See also Prof. Dixon under Heroin, Opium and Cocaine.*

Cases of ***Morphine Addiction over long periods,*** *e.g.*, a man of 71 who had taken ***30 grains daily for 40 years,*** cured by graduated doses and course of treatment in a few months, and others of an equally extraordinary nature. The conduct of these persons on emerging to relatively normal life gives grounds for grave anxiety.—Stanford Park, L. ii./26,121; P.J. ii./26,126.

In a typical case taking 12 grains of Morphine daily the dosage is cut down by 1 grain daily until 6 grains is reached, and this dose is continued until final reduction stage begins, when it is reduced by gradually decreasing amounts until final withdrawal 17 days later. Use a solution of 1 grain in 30 minims and give 4 injections in 24 hours, at 8 a.m., 12 noon, 5 p.m. and 10 p.m. The bulk and appearance of the injection must always be the same and patient must never have any idea of the size of dose. During the initial stages (up to 6 grains) both health and mental condition improve, but in the later stages and on total withdrawal there is great mental distress, insomnia, weakness, loss of appetite, and other symptoms. Blood pressure should be carefully watched: at withdrawal point the pulse becomes thready and this becomes more marked for 48 hours after withdrawal. If necessary, the injection of $\frac{1}{2}$ grain Morphine will restore pulse in a few minutes. During the final stage the patient is given the following ***mixture:*** Ammonium Bromide 2 drs., Potassium Bromide 1 dr., Tincture of Kola 1 oz., Concentrated Gentian Compound Infusion 1 oz., Liquid Extract of Licorice 4 drs., water to 6 oz.: one teaspoonful every 2 hours in a little water, continued until 4 days after withdrawal and then for 6 to 8 weeks without the Bromides. Also add 1/60 grain Strychnine Sulphate to the 8 a.m. injection, and inject 1 Cc. isotonic ***Colloidal Gold*** twice daily and $\frac{1}{2}$ Cc. Calcium Glycerophosphate, 3 grains in 1 Cc., once daily. Hot baths of value for restlessness. Alcohol should never be given either during or after withdrawal. Patient should be quite well and fit for work in from 4 to 6 months after withdrawal.—D. E. Stanford Park, Pr., Nov., '27,297—307. ***See also Colloidal Gold.***

Gradual and cautious withdrawal covered by two successive waves of overdosage by "Special Mixture" (consisting of equal parts of Tincture of Belladonna and the fluid extracts of Hyoscyamus and Xanthoxylum *cf.* p. 226), and Luminal respectively. When the total dose is reduced to ½ grain in 24 hours, without discomfort, for two days saline is given in place of the drug. No distress at any stage and no crisis. Treatment lasts ten to fourteen days.—G. Laughton Scott, Pr., Jan., '27,56. See also B.M.J. ii./27,827, and Stanford Park, B.M.J. ii./27,1056.

EMETINE HYDROCHLORIDE, in the treatment of alcoholism and Morphine habit. Three doses each $\frac{1}{6}$ grain (0·01 Gm.) per day for the first month or two; afterwards $\frac{1}{6}$ grain twice daily for Morphine patients. For alcoholism $\frac{1}{3}$ grain every other day.—M. Vivian, M.P.C., Nov. 29, '22,448.

Ⓟ **Emetine Hydrochloride Sterules** contain $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain. 'I have found the $\frac{1}{4}$ grain Emetine Sterules most useful in my patient's case. Two days before I got them he was very sick and had dry retching and could take no food. I gave him one Sterule twice a day. The first settled his stomach and also enabled him to take less of the Morphine.'—A private communication.

Morphine Addicts—1926 Committee's Report on Addiction. See Dangerous Drugs Acts.

Morphine Addiction is not characterised by physical deterioration, apart from the addiction *per se.* No change in circulatory, hepatic, renal, or endocrine functions even after 20 years' addiction.—A. B. Light, per M.A., '31,14.

See also Cocaine, Morphine, Heroin, Nicotine and Opium for further consideration of the subject.

℣ ℙ1 **Oleatum Morphinæ.** Morphine 1, Oleic Acid 60. Dissolve. Oleic acid will dissolve as much as one-tenth of its weight of pure morphine. Morphine is added to oleate of mercury to relieve pain.

℣ ℙ1 **Morphinæ Acetas, Morphine Acetate** (*B.P.* '14).

$C_{17}H_{19}NO_3,C_2H_4O_2,3H_2O = 399{\cdot}2342.$

Dose.—$\frac{1}{8}$ to ½ grain (**0·008 to 0·03 Gm.**), which may be increased.

A white powder, ***soluble*** 1 in 2½ of water, also about 1 in 100 in Alcohol 90%, Glycerin 1 in 5.

℣ ℙ1 **Injectio Morphinæ et Atropinæ Hypodermica,** *Martindale.*

Contains Atropine Sulphate 1 grain in 3 drachms of **Injection of Morphine Acetate** (1 grain in 6 minims). (**See also Sterules,** p. 558.)

Dose.—1 to 3 minims (3 minims contain half a grain of morphine acetate and $\frac{1}{60}$ grain of atropine sulphate). The atropine increases the sedative action and counteracts the disagreeable effects of the morphine on the head, stomach, and bowels.

℣ ℙ1 **Liquor Morphinæ Acetatis** (*B.P.* '14).

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Acetate 1, Diluted Acetic Acid 2, Alcohol (90%) 25, Distilled Water to 100.

Ⓟ **Pastillus Morphinæ Acetatis** ($\frac{1}{30}$ gr.), *v.* Pastilli.

℣ ℙ1 **Pastillus Cocainæ** ($\frac{1}{15}$ gr.) **et Morphinæ** ($\frac{1}{30}$ gr.).

℣ ℙ1 **Morphinæ Hydrobromidum.**

$C_{17}H_{19}NO_3.HBr.2H_2O = 402{\cdot}1112.$

Dose.—$\frac{1}{8}$ to ½ grain (**0·008 to 0·03 Gm.**).

A white powder, soluble 1 in 22 of water and about 1 in 50 alcohol 90%. Given with hydrobromic acid as sedative, affects the head less.

℞ ℙ1 **Morphinæ Hydrochloridum** *B.P.* '14, U.S., Fr. Cx., P.G. VI., P. Ital. V., F.E. VIII., P. Belg. IV. $C_{17}H_{19}NO_3HCl.3H_2O$ = 375·6678.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**), which may be increased.

In silky white crystals or in powder soluble 1 in 25 of water, about 1 in 67 of alcohol 90% (by expt.), and about 1 in 8 of Glycerin.

℞ ℙ1 **Guttæ Morphinæ et Cocainæ (Aural)**, Morphine Hydrochloride 4 grains, Cocaine Hydrochloride 24 grains, Glycerin 1 drachm, Distilled Water to $\frac{1}{2}$ ounce. *N.B.—A potent preparation.*

℗ **Linctus Morphinæ, U.C.H.**

Solution of Morphine Hydrochloride 3 minims, Chloroform Emulsion 3 minims, Treacle 60 grains, Water to 1 drachm. May be more agreeably flavoured with syrup of lemon.

Dose.—A teaspoonful 3 or 4 times a day ; repeated frequently when cough is troublesome. Taken undiluted, swallowed very slowly. *For children* of 8 to 14 years, dose 10 to 20 drops. Not suitable for very young children, or in difficulty of expectoration in bronchitis.

℗ **St. M.'s H.** has Morphine Hydrochloride Solution 10 minims. Honey $\frac{1}{2}$ drachm, Water to 1 drachm.

℗ **Linctus Morphinæ, C.X.**

Solution of Morphine Hydrochloride 2 minims, Spirit of Chloroform 2 minims, Ipecacuanha Wine 2 minims, Mucilage of Acacia $\frac{1}{2}$ drachm, Water to 1 drachm.

℗ **Linctus Morphinæ Compositus, N.H.I.** *Dose.*—1 drachm.

Morphine Hydrochloride Solution 5 minims, Syrup of Tolu and Acid Infusion of Roses equal parts, to 1 drachm.

℗ **Linctus Morphinæ Hydrocyanicus** (Ogle's Drops), St. G. H.

Dilute Hydrocyanic Acid 1 minim, Solution of Morphine Acetate 3 minims, Oxymel of Squills to 1 drachm.

℞ ℙ1 **Guttæ Rosæ.**

Dose.—2 to 10 minims (**0·12 to 0·6 Cc.**).

Morphine 1, Citric Acid 0·5, Cochineal Tincture 8, Water to 50. For cough,—a useful name and method of giving the drug.—Ph. Notes (Denmark, modified).

℗ **Mistura Morphinæ et Phenazoni Composita,** *Martindale.*

Dose.—1 ounce (**30 Cc.**).

Solution of Morphine Hydrochloride 10 minims, Phenazone 10 grains, Tincture of Castor 20 minims, Spirit of Chloroform 10 minims, Syl Lavandulæ 1 drachm, Mucilage and Water to 1 ounce.

This is virtually a specific for spasmodic dysmenorrhœa.—W.W.W.

℗ **Mistura Tussi Rubra.** *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**) in a little water. Dilute Hydrobromic Acid 5 minims, Morphine Hydrobromide $\frac{1}{3\frac{1}{2}}$ grain, Diluted Hydrocyanic Acid $\frac{1}{8}$ minim, Spirit of Ether 5 minims, Tincture of Cudbear 5 minims, Syrup to 1 drachm. This forms a popular winter-cough mixture.

℞ ℙ1 **Liquor Morphinæ Hydrochloridi** (*B.P.* '14).

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Hydrochloride 1, Diluted Hydrochloric Acid 2, Alcohol (90%) 25, Distilled Water to 100.

℞ ℙ1 **Soluté de Morphine chlorhydrate pour injection hypodermique.** Fr. Cx. 2%. Solutio Morphini Hydrochloridi P. Svec. X. is 3%.

℗ **Mistura Anodyna, N.H.W.** (Not in E.G.A.).

Solution of Morphine Hydrochloride 20 minims, Sal Volatile ½ drachm, Water to ½ ounce.

℞ ℙ1 **Suppositoria Morphinæ.**

Morphine Hydrochloride ¼ (*B.P.* '14) also ½, 1, 1½, and 2 grains (taking weight of the suppository as 15 grains).

℞ ℙ1 **Tablets, Hypodermic,** contain ⅙, ¼, ½ and 1 grain.

Trochisci Morphinæ et Emetin *v.* Emetin.

℗ **Trochisci Morphinæ et Ipecacuanhæ** (*B.P.* '14).

Contain $\frac{1}{32}$ grain (**0·002 Gm.**) of Morphine Hydrochloride, with $\frac{1}{10}$ grain (**0·006 Gm.**) of Ipecacuanha in each. Useful to allay cough.

℞ ℙ1 **Morphinæ Hypophosphis.**

$C_{17}H_{19}NO_3.HPH_2O_2 = 351{\cdot}1996$. *Dose.*—⅛ to ½ grain (**0·008 to 0·03 Gm.**).

A white powder *soluble* 2 in 1 (by expt.) of water and about 1 in 14 of Alcohol. A very useful salt for injection.

℞ ℙ1 **Hypodermic Tablets** contain ¼, ⅓, and ½ grain.

℞ ℙ1 **Morphinæ Meconas,**—Morphine Meconate. *Syn.*—incorrectly Morphine Bimeconate. (Solid Bimeconate is impossible.) $(C_{17}H_{19}NO_3)_2C_7H_4O_7+5H_2O=860{\cdot}4216$.

Dose.—⅛ to ½ grain (**0·008 to 0·03 Gm.**).

This, one of the natural salts of morphine in opium, is in white minute acicular crystals, soluble in 1 in 34 of water. It is said to disturb the head and the stomach less than the other salts.

℞ ℙ1 **Liquor Morphinæ Bimeconatis.**

Dose.—5 to 40 minims (**0·3 to 2·4 Cc.**).

Morphine (pure Alkaloid) 14½ grains, Meconic Acid 12 grains, Alcohol (90%) 1 ounce. Mix and add Distilled Water to 4 ounces. Filter. One ounce contains about 6·3 grains or 1·45% (*w/v*) of morphine bimeconate. It is about the same strength as tincture of opium.

℞ ℙ1 **Pills** contain ¼ grain.

℞ ℙ1 **Tablets, Hypodermic,** contain ⅛ and ¼ grain.

℞ ℙ1 **Morphinæ Periodidum.** $C_{17}H_{19}NO_3.2I = 539{\cdot}0202$.

Dose.—$\frac{1}{16}$ to ⅛ grain (**0·004 to 0·008 Gm.**).

A yellowish-brown powder containing 52·9% Morphine.

A considerable proportion of Morphine is dissociated in Physiological Acid (17·1% of the Periodide), and a considerable quantity (9·1% of the Periodide) is liberated on subsequent treatment with Physiological Alkali.

Solubility.—Soluble in Alcohol, very slightly soluble in Chloroform, insoluble in Ether and Water.

Incompatible with alkalis, metallic salts and otherwise as alkaloids.

Uses.—The presence of Iodine, to the extent of 47·1%, in this body may enhance the efficacy of the Morphine in it as an anodyne sedative remedy. For sleeplessness it is equal to other Morphine compounds.

Dispensing Note. To be given alone, in cachet or 'slipule' after food.

℞ ℙ 1 **Morphinæ Sulphas,** $(C_{17}H_{19}NO_3)_2H_2SO_4+5H_2O = 758{\cdot}466$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).
In white silky acicular crystals. Soluble 1 in 23 of water, very slightly in alcohol 90%.

℞ ℙ 1 **Sterules, Hypodermic, of Morphine Sulphate** contain, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain (**0·008, 0·01, 0·016 and 0·03 Gm.**).

℞ ℙ 1 **Hypodermic Tablets** contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain; also combined with **Atropine** as follows :—

Morphine Sulphate	$\frac{1}{8}$,	$\frac{1}{6}$,	$\frac{1}{4}$,	$\frac{1}{3}$,	$\frac{1}{2}$ gr.
Atropine Sulphate	$\frac{1}{200}$,	$\frac{1}{180}$,	$\frac{1}{150}$,	$\frac{1}{120}$,	$\frac{1}{100}$ gr.

℞ ℙ 1 **Hypodermic Sterules** contain **Morphine Sulphate** $\frac{1}{8}$ grain with **Atropine** $\frac{1}{120}$ grain, and $\frac{1}{4}$ grain with Atropine $\frac{1}{100}$ grain.
Morphine and Atropine are given before anæsthesia, effected by gas and ether, to lessen the amount required and to minimise the secretion from the mouth and lungs.

℞ ℙ 1 **Hypodermic Tablets of Morphine Hydrochloride** $\frac{1}{6}$, **Atropine Sulphate** $\frac{1}{200}$, **and Nitroglycerin** $\frac{1}{200}$ grain. Used in asthma.

℞ ℙ 1 **Morphinæ Tartras, Morphine Tartrate.**
$(C_{17}H_{19}NO_3)_2.(CH.OH.COOH)_2, 3H_2O = 774{\cdot}406$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).
In small white nodular tufts of acicular crystals, readily soluble 1 in 10 of water, slightly in alcohol 90%.

℞ ℙ 1 **Injectio Morphinæ Hypodermica** (*B.P.* '14).
Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).
Contains 2·5% of Morphine Tartrate (1 grain in 44 minims).

℞ ℙ 1 **Liquor Morphinæ Tartratis** (*B.P.* '14).
Dose.—10 to 60 minims (**0·6 to 4 Cc.**).
Morphine Tartrate 1, Alcohol (90%) 25, Distilled Water to 100.

ℙ 1 **Ethyl-Morphine Hydrochloride,** P. Hung., Svec., P. Jap. IV.; Fr. Cx. Supp. II. U.S. X., P.G. VI., Ph. Ned. V., P. Belg. IV., P. Ital. V. *Syn.* ✱**Dionin.** (T.M. 217175).
$C_2H_5C_{17}H_{18}NO_3.HCl.H_2O = 367{\cdot}6678$.
Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**). Maximum dose in 24 *hours,* $1\frac{1}{2}$ grains; Fr. Cx. Supp. II. says 3 grains (**0·2 Gm.**), P.G. VI. 5 grains (**0·3 Gm.**).
A white crystalline powder ***soluble*** 1 in 10 to 11 of water—W. H. M. by Expt., 1931, and 1 in 25 of alcohol 90% (by experiment). Insoluble in ether. M.pt. is ill-defined; 124° C. usually given is too high for the fully hydrated salt and too low for the salt dried at 115° C.—Dott.

Manufacture.—Data on method, see Edn. XIX, p. 565. Morphine contains one alcoholic and one phenolic OH. In this body the H of the phenolic OH is replaced by C_2H_5.

Uses.—To replace codeine and morphine in bronchitis, pulmonary emphysema, and bronchial asthma, and for whooping-cough.
A useful anodyne in glaucoma, iritis, corneal ulcers, etc. Solutions may be from 1 to 5% strength or more.

CORNEAL OPACITIES, for promoting absorption of an instillation of 5% infusion of crushed Jequirity Seeds, of value.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304; see also Trachoma, Therap. Index. Dionin if used strong enough—5%—and provided a good reaction is set up—seems useful.—T. L. de Courcy, B.M.J. ii./21,737.

May cause "ophthalmic fireworks," pain, chemosis, swelling and sneezing. In interstitial keratitis with potassium iodide internally, and yellow precipitate ointment in the conjunctival sac, of service.

Ⓟ **Guttæ Dionin** R.O.H. 1, 2, 5 or 10%. Mid. H. 1927 has 1 to 5% approx.

Ⓟ **Sterules** (Ophthalmic) **of Dionin** contain 5% Solution.

Ⓟ **Sterules, Hypodermic of Dionin** contain $\frac{1}{6}$ grain (**0·01 Gm.**).

℗1 **Ethyl-Morphine** (Base), has no distinct M.pt. It is soluble about 1 in 500 Water and 1 in $1\frac{1}{2}$ Alcohol at 25° C.

℞ ℗1 **Diamorphinæ Hydrochloridum.** *Syn.* **Diaphorm** (*Martindale*), **Diacetyl-Morphine Hydrochloride,** P. JAP. IV., FR. CX. Nouveau Supp., P.G. VI. ✱**Heroin** (T.M. 322540) **Hydrochloride.** $C_{17}H_{17}(OCH_3.CO)_2NO.HCl. = 405{\cdot}6522$. (*B.P.* '14 + H_2O). ℞ *Preparations containing any proportion* (*since Jan.* 1,'29) *of Diacetyl-Morphine, excepting Elixir Diamorphinæ et Terpini c. Apomorphinæ, and the four Lincti on p.* 560 (*by arrangement with the Pharmaceutical Society.*—P.J. i./31,185,187).

Dose.—$\frac{1}{25}$ to $\frac{1}{8}$ grain (**0·0025 to 0·008 Gm.**). Maximum dose in 24 hours (P.G.) 0·015 Gm. FR. Supp. II. 0·02 Gm.

The Hydrogen atoms of both the alcoholic and the phenolic OH groups are replaced by the $CH_3.CO$ groupings. M.pt. about 230° C. Aqueous solution must not colour blue with Ferric Chloride (absence of Morphine).

This body was first produced in London by Beckett and Wright.

Diamorphine Hydrochloride forms white crystalline powder, ***soluble*** about 1 in $2\frac{1}{2}$ of water and about 1 in 13 of alcohol 90% (our experiments). ***Incompatibles***—Both alkalis and acids and other chemicals as morphine.

Uses.—Sedative for cough, *e.g.*, in phthisis, bronchitis, and laryngitis, also in asthma. Has been given in hæmoptysis. Lengthy use must be guarded against. Useful in acute coryza.

Often more effectual than Morphine in relief of severe nerve pain. It does not constipate. The danger of addiction from its continual use must never be forgotten.—Sir W. Willcox, P.J. i./26,508.

In hay fever the following has been recommended: Heroin $\frac{1}{12}$ grain, Atropine Sulphate $\frac{1}{200}$ grain, Caffeine Citrate 1 grain, Salophen 5 grains. In cachet, one every four hours.

Recovery after 9 grains is on record.

Although Heroin (hypodermically) is preferable to Morphine for relief of pain after abdominal operations, care should be taken to see that the patient is *fully round from the anæsthetic before administering*, and only 1/12 grain should be given, repeated if necessary, as the effect of larger doses may be very dangerous to the respiratory centre. Artificial respiration necessary in two cases.—A. E. M. Woolf, B.M.J. i./29,499; see also *ibid.*, 975.

Flavoring.—*Vide* Morphine.

℞ ℗1 **Tablets, Hypodermic,** $\frac{1}{24}$ and $\frac{1}{12}$ grain.

℞℗ **Tabellæ** $\frac{1}{10}$ grain, in chocolate basis for administration *per os*.

℞℗ **Morphinum Diacetylicum, P. Austr.** *Syn.* ACETO-MORPHINE. The base of the above salt. Soluble in water 1 in 800.

℞Ⓟ **Glycaphorm.** *Syn.* GLYCEROLE OF DIACETYL-MORPHINE HYDROCHLORIDE, LINCTUS HEROIN, SYRUPUS HEROIN.

Contains $\frac{1}{48}$ grain Diacetyl-Morphine Hydrochloride in 1 drachm of a vehicle consisting of Glycerin 3, Syrup of Roses 4, Water 1.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This preparation forms a useful linctus for coughs, and is employed in bronchitis, pertussis, laryngitis, asthma, and similar disorders.

Ⓟ **Elixir Diamorphinæ et Terpini cum Apomorphina,** B.P.C. Supp. 1931. (*Exempted from* ℞).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**) diluted.

Contains 1/40 grain Diamorphine Hydrochloride and 1/32 grain Apomorphine Hydrochloride, with 5/18 grain Terpin Hydrate in 1 drachm.

Ⓟ **Linctus Diamorphinæ Camphoratus,** B.P.C. Supp. 1931. (*Exempted from* ℞).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Contains 1/40 grain Diamorphine Hydrochloride in 1 drachm, with small doses of Squill and Ipecacuanha.

Ⓟ **Linctus Diamorphinæ cum Ipecacuanha,** B.P.C. Supp. 1931. (*Exempted from* ℞).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Contains 1/40 grain Diamorphine Hydrochloride in 1 drachm, with a little Ipecacuanha, Hyoscyamus and Tolu.

Ⓟ **Linctus Diamorphinæ et Scillæ,** B.P.C. Supp. 1931. (*Exempted from* ℞).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Contains 1/40 grain Diamorphine Hydrochloride in 1 drachm, with 1/20 grain Tartarated Antimony and a little Squill and Senega.

Ⓟ **Linctus Diamorphinæ et Thymi,** B.P.C. Supp. 1931. (*Exempted from* ℞).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Contains 1/40 grain Diamorphine Hydrochloride in 1 drachm and 1/32 grain Apomorphine Hydrochloride, with a little Thyme and Tolu.

℞Ⓟ **Elixir Thymi et Diamorphinæ** (*Martindale*).

Contains Diamorphine Hydrochloride 1/48 grain in Lavender and Syrup of Thyme in 1 drachm—see *Thymus Vulgaris*.

Heroin and Morphine Addiction.—Heroin is used sometimes by injection and sometimes as a snuff like Cocaine. Supplies here and in U.S. were readily obtainable. It was vaunted as a cure for morphinism. The addict prefers it to Morphine. The Morphine addict has only one or two stools a week, whereas the bowels of the Heroin addict are almost normal. There is not so much pallor or emaciation. In New York Heroin is used almost entirely.—W. E. Dixon, B.M.J. ii./21,821.

British trade in Morphine and Heroin—figures from 1910—1923. The figures for Morphine and salts manufactured fell from 1,033,162 oz. in 1916 to 87,940 oz. in 1923.—B.M.J. ii./24,830. See also B.M.,J. i./20339.

Departmental Committee on Morphine and Heroin Addiction (1924) reported (1) on circumstances in which supplies may be regarded as ***medicinally advisable,*** and (2) whether desirable that preparations containing less than ℙ amounts should be brought into the provisions of the acts and regulations. Addictions rare in this country.

There is little, if any, abuse or danger from any preparation at present excluded, with possible exception of Chlorodyne—there is some risk. Suggestion made that no preparation should be sold under the name 'Chlorodyne' which contains more than 0·1% Morphine.—P.J. i./26,238; B.M.J. i./26,391.

Complete Prohibition of Heroin probably desirable.—W. E. Dixon, B.M.J. ii./27,236. *It has been effected.*

Addicts in Egypt prefer *their Heroin intravenously*—believed to be due to the rapid relief obtained from intravenous injection of drugs for bilharzia. Terrible results follow its use.—A. G. Biggam, Jl. Roy. Soc. Trop. Med., Aug. 26, '29,147.

Egypt has roughly half a million drug addicts. Drugs taken for sexual stimulation, in ignorance of the fact that it is a common cause of impotence.—J. D. Rolleston, Brit. Jl. Ineb., 1930, per M.A., '31,14.

Interesting recent data on commerce in Dangerous Drugs in the Near East. 'Byng' Broom has cleared up situation at home.—Sir Wm. Willcox, L. i./31, 1241.

Turkish Government agreed six months ago to control three factories in Stamboul making Morphine and Heroin.—N. H. Linstead, L. i./31,1242.

Traffic in Narcotic Drugs. Egypt with its half million addicts in 14 million population. Chicago gangsters use Heroin and Cocaine.—Per B.M.J. ii./30,698.

Problem only a small one in this country—Home Office only knows of 250 addicts. *England one of the model countries of the world*—only 70 prosecutions last year, mostly for minor offences.—E. Mapother, L. i./31,587.

League of Nations Technical Committee on the Heroin Habit Report. Heroin could ***be entirely dispensed with—all its beneficial actions can be obtained by other drugs.***—L. ii./31,56.

See also *Dangerous Drugs Acts and Absts. under Cocaine, Morphine, Opium, Nicotine.*

ℙ1 **Morphine-Methyl Bromide.** *Syn.* MORPHOSAN.

$C_{18}H_{23}NO_3Br.H_2O = 398{\cdot}1132.$

Dose hypodermically, $\frac{1}{8}$ to $\frac{1}{4}$ grain (**0·008 to 0·016 Gm.**).

White needles soluble 1 in 20. Comparatively with Morphine it is non-poisonous—it is thought to be 10 times less potent.

Uses.—In epilepsy, also for use with Scopolamine *q.v.* as anæsthetic.

ℙ1 **Morphine Methyl Chloride.** $B.CH_3Cl.2H_2O = 389{\cdot}6838$. Soluble 1 in 10 water. It resembles Morphine in its reactions with Ferric Chloride, Nitric Acid, etc., but its solution gives no precipitate with Sodium Carbonate or Ammonia, while its acidified solution gives a bulky crystalline precipitate with Potassium Ferrocyanide, Morphine salts yielding no precipitate.—D. B. Dott, P.J. i./21,232.

ℙ1 **Benzyl-Morphine Tartrate.**—Soluble readily 1 in 3. The Hydrochloride of this base is readily soluble 1 in 200; the Sulphate 1 in 170.—D. B. Dott, P.J. i./26,356.

ℙℙ1 ✱**Dilaudid.** (T.M. 475650). *Syn.* DIHYDROMORPHINONE HYDROCHLORIDE. $C_{17}H_{19}O_3N.HCl. = 321{\cdot}621$.

Dose.—1/12 grain (5 mgr.) represents a dose of 1/6 to 1/3 grain (0·01 to 0·02 Gm.) of Morphine. This dose is effective for 4 to 6 weeks without increasing.

A preparation analagous with Dicodid. Soluble in Water and Alcohol, insoluble in Ether. Stated to be three times stronger than Morphine, and used to replace Morphine. The dose is correspondingly less.

ℙℙ1 **Tablets** are available containing 0·0025 Gm. of the Hydrochloride. Also issued in **Sterules,** 1 Cc. = 0·002, 0·004 and 0·005 Gm. Made also in combination with ℙℙ1 Scopolamine Hydrochloride 0·0003 Gm.

Introduced to reduce the undesirable secondary effects of Morphine. In post-operative pain effective in dose of 2/5 the corresponding dose of Morphine. Tends to prevent sleep. No vomiting or headache.—Per Qtrly. Jl. Ph., '29,358.

Applied to Part III of the ℙ 1920.—P.J. i./30,683.

Used with beneficial effects in pleurisy, sciatica, facial neuralgia, angina pectoris, and acute arthritis, to replace Morphine, but of no value when Morphine addiction has developed. Unlike Morphine, it is not necessary to increase the dose. It may cause transient nausea, giddiness, and confusion but does not cause constipation or affect the appetite.—O. Leyton, L. i.,32/835.

℞ **Papaverina.** F.E. VIII. $C_{20}H_{21}O_4N = 339{\cdot}1718$. An alkaloid of Opium (0·5 to 1%). M.pt. 147° C. Easily soluble in hot alcohol, but with difficulty in the cold.

℞ **Papaverinæ Hydrochloridum. Ph. Ned. V., P. Svec. X., P. Belg. IV., F.E. VIII., P. Ital. V.** $C_{20}H_{21}O_4N.HCl = 375{\cdot}6368$.

Dose.—½ grain (**0·03 Gm.**) to 3 grains (**0·2 Gm.**).

P.G. VI. gives latter as max. single dose and 10 grains (**0·6 Gm.**) as max. dose in a day.

A white crystalline powder slowly soluble 1 in 40 in water. The Sulphate is more employed, *v. postea*.

℞ **Papaverinæ Periodidum.** $C_{20}H_{21}O_4N.2I = 593{\cdot}0358$.

Dose.—½ grain (**0·03 Gm.**) carefully increased if necessary.

When made by interaction of Papaverine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) the compound is obtained as a dark-red crystalline powder containing 57·1% Papaverine, according to investigations in the author's laboratories (1923).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Uses.—Salts of Papaverine have attracted attention by their analgesic action. The Periodide, containing 57·1% of the alkaloid, in conjunction with 42·9% of Iodine in a labile form, suggests it being of value in gastric and intestinal spasms. It is also worthy of trial in bronchial spasmodic affections.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after food.

℞ **Papaverinæ Sulphas.** $(C_{20}H_{21}O_4N)_2H_2SO_4 = 776{\cdot}4192$.

Dose.—½ to 1¾ grains (**0·03 to 0·11 Gm.**) *per os* or hypodermically up to 8 grains (**0·5 Gm.**) in a day.

A white crystalline powder soluble 1 in 2 in water—by expt.—W. H. M. It is said to be non-toxic in single doses of even 1 Gm.

A rather feeble central analgesic and a local anæsthetic. Does not induce a habit like morphine. In all kinds of gastric and intestinal spasms (also for the diagnosis of pyloric spasm); in biliary colic; and in bronchial spasm. Of more doubtful value in pertussis, hyperemesis, and vascular spasm—angina pectoris, acute uræmia and eclampsia. The local anæsthetic action, with vasodilatation, has been used against rhino-asthma, and to mitigate the pain of irritant injections.

Ureteral Calculus treated by Papaverine. In the case of a man aged 72, after catheterisation and injection of oil had failed 5 Cc. of 2% solution Papaverine Hydrochloride were instilled through a catheter and six days later 5 Cc. of 2% Papaverine Sulphate Solution. Stone was removed from floor of bladder with Young's rongeur. In another case of a man aged 40, ten days after instilling 5 Cc. of the Papaverine Hydrochloride Solution fragment of stone was dislodged and recovered in bladder washings. Papaverine Sulphate Solution was again instilled and the following day the stone was produced in the urine. In a further case of a man 33, withdrawing catheter to a point just above obstruction, 3 Cc. of the Hydrochloride Solution were instilled and the stone was expelled a few days later per urethra. Striking feature in these cases was the absence of renal colic following the use of Papaverine. It is non-toxic in the dosage employed.—H. A. Fowler, Annals of Surgery (U.S.A.) May, 1917.

Tablets of Papaverine (Base) $\frac{1}{3}$ grain, **Hyoscyamine** (Base) $\frac{1}{500}$ grain, and **Benzyl Succinate** 5 grains.

Employed for calmative analgesic effect.

***Eupaverin** (T.M. 515055). A synthetic compound, $C_{19}H_{15}O_4N$, with action similar to Papaverine, but stated to be less toxic.

Combination of Narcotic Drugs.

It has been shown that combinations of Narcotic Drugs may be more potent than would be expected by taking the sum of the two substances, *e.g.*, in the case of Codeine Diethylbarbiturate + Sodium Diethylbarbiturate. In other instances by adding a weak substance to a potent narcotic, marked increase in narcotic power occurs. (The maximum effect, according to Straub, in the case of Morphine + Narcotine only occurs with certain proportions.)

The same exists in the case of the naturally occurring Opium Alkaloids. A mixture of all the alkaloids of Opium has a narcotic effect not only greater than the Morphine in it will account for, but much greater than a summation of the effects of the different alkaloids would lead one to expect.—B.M.J.E. i./13,84.

Morphine Meconate is stated to be 25% stronger than the equivalent dose of Morphine Hydrochloride—due to the action of the Meconic radical.

BURGI'S THEORY is as follows :—

Drugs having the same physiological action summarise their therapeutic effect when given together, but drugs of different pharmocological action given together increase their activity markedly more than the sum of their action when given separately—they probably act on different cells. Thus Morphine, Codeine, Heroin, and Thebaine give results equal to the sum of their effects, but combined doses of Morphine, Narcotine, and Papaverine are 20 to 50% more toxic than the same doses separately. The word **Synergism** has been adopted to indicate the action of one drug in enhancing the effect of another.

℗ **Codeonal.** *Dose.*—Two $2\frac{1}{2}$ grain Tablets in the evening.

A combination of Codeine Diethylbarbiturate (2 parts) with Sodium Diethylbarbiturate (15 parts).

It appears that Codeine is the only Opium alkaloid that can form this combination. ***Soluble*** about 1 in 30 of water.

Uses.—Hypnotic, in disease of the nervous system and pulmonary disorders. It takes effect after about half an hour.

℗ **Morphine Narcotine Meconate.** *Syn.* ***Narcophin** P.G. VI. (T.M. 341895.)

Dose.—$\frac{1}{3}$ to $\frac{1}{2}$ grain (**0·02 to 0·03 Gm.**).

Manufacture and Patents (void), see Edn. XIX, p. 569.

Yellowish crystals containing about 30% Morphine and 43% Narcotine, *soluble* 1 in 5 in water approximately, but not completely.

Uses.—Hypnotic. It is similar in action to Morphine and Scopolamine and is used where Morphine is employed, also where Morphine alone is inadmissible (diseases of organs of respiration, etc.).

It is stated that the paralysing action of Morphine on the respiratory centre is lessened greatly by adding an equal quantity of Narcotine. In the case of mice the toxicity of the two together is so small as to be hardly measurable. The most increase in narcotic effect is obtained by using equal weights.

P P1 ✱ **Spasmalgin** (T.M. 397986).—Combination of Papaverine, Omnopon and Atrinal (a Sulphonic derivative of Atropine). In gastric pain, colic and painful menstruation.—L. ii./20,506.

1·1 Cc. of Spasmalgin Injection or each Tablet corresponds to 0·02 Gm. Papaverine, 0·001 Gm. Atrinal and 0·01 Gm. Omnopon. *Dose.*—One to two tablets a day increased to four in severe cases.

See also ***Synergistic Method of Painless Childbirth*** (Gwathmey) ***by Rectal Ether Analgesia.***

MULLS.

Anserine Mulls consist of Medicated Ointments prepared with a basis of **Goose Grease** (**Oleum Anseris**) depurated and benzoated, spread on calico Bandages. They are prepared 4 and 7½ inches wide by 1 yard. Goose fat possesses the *highest penetrating power* amongst absorbent ointment bases. The following **Medicated Anserine Mulls** are made :—

Acid Boric 10%
Acid Carbolic 2%
Chrysarobin 2%
Ichthyol 10%
Oleum Rusci 5%
Scarlet Red 4%
Sulphur 10%
Thiosinamin 5%

Adepsine Mulls are bandages similar to the above, but prepared with Benzoated Lard basis. This is suitable where deep penetration is not so essential *e.g.*, **Adepsine Mulls** :—

Acid Boric 10 and 20%
Acid Carbolic 2 and 4%
Acid Salicylic 5 and 10%
Bismuth Carbonate 20%
Liquor Carbonis Det. 10%
Resorcin 5%
Zinc Oxide 10%
Zinc Oxide 20% + **Ichthyol** 10%
Zinc Oxide 20% + **Calamine** 5%

Plaster-Mulls of soft rubber adhesive plaster basis, spread on cotton cloth.

No.		%	No.		%
4	Acid Carbolic ...	5			
9	Acid Salicyl. ...	25	88	P Hydrarg.	20
64	P Acid Salicyl. ...	20		P Acid. Carbolic ...	10
	P Ext. Cannabis Ind.	5		P Hydrarg. Perchlor.	2
76	Acid Salicyl. ...	10		P Zinc Oxide ...	10
	Creosote	20	66	Ichthyol	10
15	Hydrarg.... ...	20	7	Pyrogallol... ...	10
16	Hydrarg.... ...	20	232	Thiosinamin ...	20
	Acid. Carbolic ...	7·5	24	Zinc Oxide ...	10
			74	Zinc Oxide ...	10
				Ichthyol	5

White adhesive Rubber Plasters containing a proportion of Zinc Oxide spread on pink cotton are also made, 2½, 3¾ and 5 Cm. wide, in spools.

NAPHTHOL.

Beta-Naphthol (*B.P.* '14). U.S., Fr. Cx., P. Belg., P. Austr., Ph. Ned. V., F.E. VIII., P. Belg. IV., P. Ital. V. $C_{10}H_7OH = 144{\cdot}0624$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) in cachet or Slipule (No. 00 for 5 grains). Fr. Cx. *Max. single dose* 15 grains; Max. dose during 24 hours 45 grains approximately.

Manufacture.—
Naphthalene is sulphonated at about 180° C. and the resulting β-Naphthalene Sulphonic Acid is fused at 300° C. with Caustic Soda. Further Notes Edn. XVIII, p. 563.

β Naphthol has a faint Storax odour; when sublimed it is in white shining laminar crystals; ***Soluble*** in alcohol 1 in 2, ether 3 in 4, chloroform 1 in 24, and 1 in 24 benzol; 1 in 12 of olive oil and lard, and 1 in 80 of vaseline. Addition of boric acid increases solubility in water.

Incompatible with Camphor, Ferric Chloride, Menthol, Phenazone and Phenol.

Uses.—Internally, in enteric fever; safe and efficient, but sometimes causes too much gastric disturbance. In dilated stomach, dyspepsia and other disorders. In cholera, as preventive, and in treatment of early stages; and used as a vermifuge. In kidney disease it is contraindicated.

It is a powerful antiseptic and germicide. In advanced scabies, an ointment of 10 to 15% cures the eczema as well as destroys the parasite, but the **Compound Ointment L.H.** (Kaposi's Ointment) is preferred.—β-Naphthol 15, Lard 100, Green Soap 50, Prepared Chalk 10. Useful also in psoriasis.

β-Naphthol 5, Alcohol 100, Glycerin 10, is a remedy for hyperidrosis of palms, soles and axillæ.

Pills and Tablets, β-Naphthol 3 and 5 grains, are prepared.

Tablets of Betanaphthol 5 grains (**0·3 Gm.**) **with Phenolphthalein** 3 grains (**0·2 Gm.**).

To combat ankylostoma infection. A useful combination.

Ankylostomiasis and Malaria. 75% of malaria cases in Malay States are also ankylostomiasis cases. It may be that the ankylostoma worm is as much responsible for malaria as the mosquito. Quinine cannot be given in large or continuous doses. Best results with Betanaphthol and Ol. Chenopodii.—D. Bridges, B.M.J. ii./21,149.

Ankylostomiasis treated by 30 grain doses caused poisoning. Thymol may be safer.—W. B. Orme, B.M.J. ii./15,176.

Ascaris infection treated with Betanaphthol showed cure in a large percentage of cases.—C. N. Leach and G. E. Hampton, per Jl. Trop. Med., May 1, '23,145.

Dyspepsia, Flatulent. Betanaphthol 5 grains, Salol 5 grains and Calomel $\frac{1}{6}$ grain combined in capsules valuable. A paper on pre-operative treatment of enlarged prostate.—J. W. Thomson Walker, B.M.J. i./21,71.

Trachoma treated by '**Oxidised Naphthol Camphor.**' The remedy should be freshly prepared, 2 parts of Camphor and 1 of Naphthol warmed gently and filtered, and the mixture allowed to oxidise in a clear glass vessel to syrup consistence and brown mahogany colour. The application is made with a small brush well soaked in the solution and then wiped nearly dry. Four to ten applications suffice.—G. Gerard, Pres., Sept., '20,312.

Tænia. Betanaphthol, 15 grains for ten days, on an empty stomach effectual, after male fern had eliminated everything except the head.—J. W. Tomb, L. i./23,1131.

Charbon Naphtholé. *Dose.*—60 to 120 grains. A granular preparation of wood charcoal, containing 5% β-naphthol, for use in ailments of the stomach and intestines.—Ph. Notes, Greece.

P. Ital. V. gives:—Beta Naphthol 3, Charcoal 4, Magnesium Oxide 3, prepared with Alcohol 95%, 5.

α-Naphthol, F.E. VIII. $C_{10}H_7.OH = 144{\cdot}0624$ is said to have greater antiseptic power, but given internally causes more irritation.

Manufacture.—This is also made from Naphthalene on similar lines to β-naphthol. The sulphonation must be conducted at a *very low* temperature.

A solution of 1 in 3,500 of water is used to wash out the intestines by rectal injection.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) but larger doses are given.

Benzonaphthol.—*Syn.* **Benzoyl - Naphthol.** Beta-Naphthol Benzoate. Fr. Cx., P. Ital. V., P. Belg. IV. $C_{10}H_7OOC : C_6H_5 = 248{\cdot}0936$.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**) in cachet or suspended.

Manufacture.—Add Benzoyl Chloride 140 to finely powdered β-naphthol 144. Then heat to 125° C. ½ hour and pour the liquid into equal volume of water. Filter off and recrystallise (*twice*) from Alcohol, and wash with water.—M.Pt. 110° C.

A white crystalline powder. Soluble in alcohol and chloroform, almost insoluble in water. An intestinal antiseptic and diuretic, *e.g.*, in typhoid. May be combined with bismuth salicylate. Externally is used 3 to 10% in ointments. **Tablets**, 5 grains, to be crushed and taken in a little water.

Betol. *Syn.* **Naphthalol, Betanaphthol Salicylate.** Fr. Cx. $C_6H_4OH.CO.OC_{10}H_7 = 264{\cdot}0936$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in cachets or pills, or suspended in almond emulsion or milk.

Manufacture.—Beta Naphthol 144 and Sodium Salicylate 168, are intimately mixed and Phosphorus Oxychloride 80, added with trituration. When solid the mixture is heated until Hydrochloric Acid ceases to be evolved. Recrystallise from spirit. M.pt. 95° C. *Further data, Edn. XIX, p.* 572.

In small tasteless white crystals, insoluble in water, soluble in alcohol. Useful in rheumatism, cystitis, and intestinal catarrh.

Cachets of Betol and Bismuth Salicylate. 5 grains each, useful as an intestinal disinfectant. Contra-indicated in renal disease.

Naphthalene. Ph. Ned. V., P. Ital. V. $C_{10}H_8 = 128{\cdot}0624$.

Dose.—2 to 15 grains (**0·12 to 1 Gm.**) in cachets.

A hydrocarbon formed in the manufacture of coal gas. In white crystalline plates (M.pt. 80° C.) with persistent odour.

Soluble in Ether 1 in 3, in Alcohol 1 in 25, in Olive Oil 1 in 8, in Chloroform 1 in 1½, insoluble in water.

Uses.—As an intestinal disinfectant for the diarrhœa of consumption, and of typhoid and for dysentery. 8-grain enemata are useful. Is painless in action, and promotes healing of ulcers. Internally, *e.g.* in Malt Extract, with success to lessen fœtor of urine and stools. A vermifuge in tænia and ascarides. Suppository and ointment

(10%) are used for pruritus ani. A 10 to 20% solution in oil is successful as a parasiticide in scabies. The vapour is inhaled for whooping cough.

Seven doses (1·75 Gm. in all) of Naphthalene taken as anthelmintic in the case of a child six years old caused death.—P.J. ii./11,407.

Pilula Naphthalini, 3 grains.

A Precipitated Form is also made by adding an alcoholic solution to water. For use as a dusting powder diluted 1 in 10

Mosquitos in wells, etc., can be destroyed by Naphthalene.—B.M.J. ii./14,15.

N.C.I.—Naphthalene of commerce with 2% Creosote and 2% Iodoform. Used as a vermicide in the war. Must not be used too freely. Used in conjunction with Vermijelli. Naphthalene 96, Creosote 2, French Chalk 2 might replace.—J. P. Kinloch, B.M.J. i./16,790.

Undervests of butter muslin dipped in a solution of 1% each Naphthalene and Sulphur in benzol or petrol effectual in preventing pediculosis.—J. A. Gunn, B.M.J. i./17,579.

Naphthalene Tetrachloride.—*Syn.* NAPHTHALIN HYDROCHLORIDE, $C_{10}H_8Cl_4$=269·8904. *Dose.*—3 to 12 grains (**0·2 to 0·8 Gm.**).

Manufacture.—By chlorinating Naphthalene 400 with Potassium Chlorate 800 and Hydrochloric Acid. Data, Edn. XIX, p. 573.

White crystals, melting at 182° C., insoluble in water.

Has been used in cases of bacterial intoxication such as colitis with improvement. It is doubtful whether the substance acts as an antiseptic after leaving the stomach. It was tried in 8 grain cachets every 4 hours (night as well).—J. Langford Moore, St. Bart.'s Hosp.

Formagules of Naphthalene Tetrachloride contain 5 grains.

Di-chlornaphthalene and **Tetrachlornaphthalene** used in a spray for killing flies in food-shops have caused illness owing to tainted food.—C. E. Sage.

ℙ1 NARCOTINA.

Syn. ANARCOTINE. $C_{19}H_{14}(O.CH_3)_3NO_4$=413·1874.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) or more in a pill.

An alkaloid from opium (sometimes as much as 15% of), in white crystals, insoluble in water, soluble 1 in 3 of chloroform, 1 in 100 of 90% alcohol, 1 in 125 of ether, soluble also in benzol. An antiperiodic of great power,—analogous to, if not identical with, Quinine. Has been used in malaria and in sleeping sickness. Dose as above. *cf.* also Morphine Combination.

ℙ1 **Narcotine Hydrochloride** PH. NED. V.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**). White crystals soluble in water about 1 in 4.

ℙ1 **Cotarnine Hydrochloride.** PH. NED. V., F. E. VIII. (P.G. VI. gives formula $C_{12}H_{14}O_3NCl+2H_2O$). *Syn.* ✱**Stypticin** (T.M. 216872).

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) internally or hypodermically, in special cases up to 4 grains in 10% solution.

The salt of the base ℙ1 Cotarnine obtained by oxidising narcotine with manganese dioxide and sulphuric acid, in primrose coloured granular crystals, very soluble in water and alcohol. It was placed on the market by a British firm long before the Germans boomed it under the fancy name.—F. A. Hocking. M.pt. 125° C. (Dott). It is allied to Hydrastinine (*q.v.*).

The alkaloidal base Cotarnine is $C_{12}H_{15}NO_4.3H_2O$. The hydrochloride is not anhydrous, but loses water on drying, agreeing with the formula $(C_{12}H_{15}NO_3HCl)_2.5H_2O$.—D. B. Dott, C.D. i./26,7 ; i./32,14. *Note* P.G. VI. formula *antea*.

Cotarnine is generally regarded as anomalous in containing water which cannot be removed, while the dried hydrochloride is anhydrous. But if the latter is regarded as cotarnine chloride and the base as cotarnine hydroxide, there is nothing anomalous.—D. B. Dott, C.D. i./32,14.

Uses.—In all forms of uterine hæmorrhage, useful in checking profuse menstruation. 1 to 2% may be used on a tampon.

To check bleeding in prostatic hæmorrhage ¾ grain *per os* thrice daily of value.—J. R. Logan, B.M.J. ii./29,1184.

Erysipelas, eczema and shingles may be treated with a 5% ointment.

℗ **Tablets of Cotarnine Hydrochloride**, ¾ grain (**0·05 Gm.**).

℗ Ointment 2% with Unguentum Lanolini, in herpes and ulcerative balanitis. In more acute similar complaints up to 10% strength.

℗ **Stypticin Wool**, 30% and ℗ **Gauze** are made.

℗ **Urethral Bougies of Cotarnine** in cacao butter or gelatin contain ½ grain (**0·03 Gm.**), four inches long, and ⅙ inch in diameter, are used to check bleeding caused by sounds or catheters.

ℙ1 **Cotarnine Phthalate.** ✱Styptol (T.M. 253307).

$(C_{12}H_{15}NO_4)_2.C_6H_4COOH.COOH = 640{\cdot}2978$.

Dosc.—¾ grain (**0·05 Gm.**), but much larger doses are given by some practitioners, *e.g.*, 10 grains without unpleasant effects, every 2 to 3 hours. Five grain doses suitable for mild cases.—George Foy.

An orange red body soluble in water. Contains 73% Cotarnine.

℗ **Styptol Tablets** ¾ grain (**0·05 Gm.**).

Myristicin, the constituent of nutmeg, dill and parsley oils, can be used as a starting-point for the synthesis of the base Cotarnine, and thence to produce stypol and stypticin.—Zeit. f. Angew. Chem., 1911,40. *Cf.* Hydrastinine, *Vol. II.*

NEBULÆ.

These are solutions for application to the throat and nose by the aid of a fine spray apparatus or atomiser. By means of a glass, metal or vulcanite tube, a jet of fine spray may be directed into the pharynx or nares, and if a deep breath be taken at the proper moment some of the spray will enter the larynx. The patient must be taught to carry this out personally. Nebulæ are aqueous, or of Liquid Paraffin, Almond Oil or Olive Oil. The following indications may prove useful :—

Antiseptic and Demulcent.—**Nebula Alkalina, Nebula Mucin**, *q.v.*

Antiseptic and Soothing.—(*a*) **Nebula Acidi Borici**—Glycerin of Boric Acid 1 drachm to the ounce ; (*b*) **Nebula Potassii Permanganatis**, 1/10 grain in 1 ounce of Normal Saline ; (*c*) **Nebula Acidi Tannici**—Glycerin of Tannic Acid 40 minims, Rose Water to 1 ounce.

Analgesic.— ℍ ℙ1 **Nebula Cocainæ Oleosa**, *vel* **Aquosa** *q.v.*

Asthma.—(*a*) **Nebula Anti-asthmatica "Compound Asthma Fluid"** *q.v.* and (*b*) ℗ **Nebula Lobeliæ Composita**—Lobelia Tincture, Belladonna Tincture, Stramonium Tincture, of each 10

minims, Ipecacuanha Tincture 5 minims, Sodium Nitrite 10 grains, Glycerin and Rose Water to 1 ounce. (*c*) **Nebula Ephedrinæ Simplex,** (*d*) **Nebula Ephedrinæ Composita,** (*e*) **Nebula Ephedrinæ Aquosa,** *q.v.*

Astringent.—(*a*) Ⓟ **Nebulæ Zinci Chloridi,** 10 to 25 grains, with Rose Water 1 ounce; (*b*) **Cupri Sulphatis,** 5 grains to the ounce; (*c*) **Ferri Perchloridi,** *q.v.*; (*d*) **Hydrargyri Nitratis** (*q.v.*).

Diphtheria.—To dissolve membrane, **Nebula Acidi Lactici,** *q.v.*

Catarrh, Nasal and congestive state of the Eustachian tubes.—℞ ℙ1 **Nebula Cocainæ Composita**—Cocaine 2 grains, Cinnamon Oil 5 minims, Menthol 15 grains, Liquid Paraffin to 1 ounce. **Nebula Resorcini** 1%. **Nebula Antipyrini** 3%.

Catarrh, Dry.—(*a*) **Nebula Eucalypti**—Eucalyptus Oil 20 minims, Liquid Paraffin to 1 ounce; and (*b*) **Nebula Eucalypti Composita**; (*c*) **Nebula Mucin,** *q.v.*

Hay Fever.—(*a*) **Nebula Suprarenalis Extracti,** 5% and 10%; (*b*) **Nebula Quininæ**—Quinine Hydrochloride 10 grains, Glycerin and Rose Water to 1 ounce.

Phthisis.—(*a*) **Nebula Creosoti Composita.**—Creosote 5 minims, Cassia Oil 5 minims, Almond Oil to 1 ounce; (*b*) **Nebula Iodi Composita**—Iodine 2 grains, Carbolic Acid 8 grains, Menthol 5 grains, Camphor 2 grains, Liquid Paraffin to 1 ounce. 2% Creosote may be added (if made with Almond Oil).

Stimulant.—(*b*) **Nebula Mentholis,** *q.v.*; (*b*) **Nebula Mentholis Composita**—Menthol and Camphor, 20 grains each, Cinnamon Oil 5 minims, Liquid Paraffin to 1 ounce; (*c*) **Nebula Potassii Chloratis cum Ferro.**—Potassium Chlorate 15 grains, Solution of Ferric Chloride 20 minims, Glycerin 1 drachm, Water to 1 ounce. (*d*) **Nebula Chlorbutolis Composita St. Th. H.**—Chlorbutol 15 grains, Camphor 40 grains, Menthol 40 grains, Cinnamon Oil 8 minims, Liquid Paraffin to 3 ounces.

For a common cold where *B. Septus* is the principal cause of infection, as spray and gargle Potassium Chlorate 10 grains, Solution of Ferric Chloride 15 minims, Glycerin 30 minims, and Water to 1 ounce, are useful. This is said to be of little value after 24 hours, when give a Potassium Chlorate gargle.

Tonic.—(*a*) **Nebula Pini Composita,** containing Pine Oil, Eucalyptus Oil, Cassia Oil, of each 5 minims, Menthol 5 grains in Almond Oil 1 ounce; also (*b*) ℞ ℙ1 the same, with Cocaine 1%.

For further formulæ, consult Index.

Intratracheal medication with medicated oil.—A. R. Friel, B.M.J. i./22,149.

NITROGLYCERINUM, P. Jap.

$C_3H_5(O.NO_2)_3 = 227{\cdot}063$.

Syn. Trinitroglycerin; Glonoin; Trinitrin; Glyceryl Trinitras.

Dose.— $\frac{1}{200}$ to $\frac{1}{50}$ grain (**0·0003 to 0·0013 Gm.**) increased to $\frac{1}{10}$ grain.

Manufactured by adding Glycerin to Nitric and Sulphuric Acid mixed A mixture of 3 parts by weight Nitric Acid Sp. Gr. 1·3 and 5 parts by weight of Sulphuric Acid Sp. Gr. 1·842 is used, and to nitrate 1 part by

weight glycerin is added to 8 parts by weight of the mixture. By using Nordhausen Acid a yield of 230 per cent of Nitroglycerin is obtainable.—Chem. News, Feb. 14, '08,74. See also P.J. i./09,160, and especially 'Explosives' by E. de Barry Barnett, 1919.

The finished and washed Nitroglycerin is mixed with Siliceous Earth, *e.g.*, Kieselguhr. This earth is used for its absorbent power in making Dynamite.—Alfred Nobel's discovery in 1866. **Guncotton** is made by mixing with cotton waste from the Lancashire spinning sheds. Other mixtures are known as **Gelignite** (containing 56·5%), **Samsonite, Saxonite** and **Carbonite** (25% with Potassium Nitrate 30, Barium Nitrate 4, Wood Meal 40 and Sodium Carbonate 1%).

Cordite.—Stated to have composition Nitroglycerin 30, Nitrocellulose 65, Soft Paraffin 5.

Nitroglycerin is a dense, opaque, white, oily liquid, transparent when dehydrated, and of Sp. Gr. 1·600. It has no odour, is slightly volatile, and has a sweet, aromatic, and pungent taste. It is slightly soluble in water, P. Jap. III. gave 1 in 800, freely soluble in ether, 1 in 6 of almond oil, freely soluble in absolute alcohol, and 1 in 15 of 90% alcohol. Nitroglycerin in fatty or oily solution is perfectly safe and stable, but in Alcoholic Solution the substance must be handled with the utmost caution.—*Vide infra.*

Physiologically it belongs to the class of nitrites—probably, therefore, sodium nitrite is formed directly it gets into the blood.

Notwithstanding the effect on the vascular system by 1/1600 grain of Nitroglycerin (D. J. Leech) or a fraction of a minim of Amyl Nitrite, even large quantities of the medicinal preparations do not readily cause death.—R. R. Pirrie, Pr., Feb., 1912,259.

It is absorbed into the blood practically unchanged, hence its powerful and prolonged action (Brunton)—ex Pharmacol.

Physiological action of Nitroglycerin and the Nitrites. Formation of Sodium Nitrite in the blood (Matthew Hay). Gamgee's work on Methæmoglobin production. Observations of Haldane, Maghill and Mavrogordato on conversion of hæmoglobin into a mixture of Methæmoglobin and Nitric-Oxide-Hæmoglobin under the influence of Nitrites. Murrell's work on the effects of Nitroglycerin on the lower animals.—R. R. Pirrie, Pr. Feb., 1912,259.

Pharmacological action of Nitric Esters.—These bodies act mainly on unstriped muscle fibre and especially on that of the arterioles. The esters of the Monohydric Alcohols (Methyl, Ethyl, etc.) are relatively weak. Methyl Nitrate, for example, injected intravenously is more than ten times weaker than Nitroglycerin, and when given by the stomach more than 100 times weaker. The presence of OH groups (in the higher series) diminishes action as compared with the fully nitrated esters.—C. R. Marshall, B.M.J. ii./12,644.

Lethal dose of Nitroglycerin ***intravenously*** in rabbits is 45 mgr. per kilo. Asphyxia the major cause of death.—T. V. Oltman and L. A. Crandall, Jl. Pharm. and Exp. Therap., Jan., '31,126.

Minimal effective dose intravenously in rabbits 0·03 mgr. perkilo.—H. B. Myers and V. T. Austin, Jl. Pharm. and Exp. Therap., June, '29,229.

Tolerance may develop to a marked degree but is of exceedingly short duration. A case recorded failing to respond after 6 months' use to 500 times the initial dose.—H. B. Myers and V. T. Austin, Jl. Pharm. and Exp. Therap., June, '29,227.

Uses.—Especially valuable in angina pectoris and generally to relieve dyspnœa of cardiac, pulmonary, or renal origin.

Nitroglycerin, in two minutes after taking a dose accelerates the pulse, relaxes the arteries, produces a feeling of fullness all over the body, but particularly in the head by a throbbing at the sides of the temples. It also causes headache, which lasts from 15 minutes to several hours, according to the quantity taken; but to patients accustomed to its use the headache is not felt. In treating angina pectoris, neuralgia, asthma, headache, sea-sickness, and Bright's disease, its

action is like that of amyl nitrite and the other nitrites, but its effects last much longer. For the weak heart of fatty degeneration and of old persons, this lessened tension proves valuable. It has been given in hæmoptysis.

Strychnine, Ergot and Belladonna are recommended to counteract the headache produced by large doses.

For further notes on treatment see References postea.

Injectio Nitroglycerini Hypodermica.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

Nitroglycerin Solution 5, Alcohol (90%) 2, Distilled Water to 12.

Contains about $\frac{1}{240}$ grain in 1 minim. Acts promptly; useful in collapse, etc., when the patient cannot swallow.

Liquor Nitroglycerini, 1%. *Syn.* **Liquor Trinitrini** (*B.P.* '14). **F.E., P. Jap. III.** (now omitted), **P. Hung., P.G. VI., P. Belg. IV.** **Ph. Ned. V.** gives direction for making direct from glycerin by nitration with Nitric and Sulphuric Acid mixture.

Dose.—$\frac{1}{2}$ to 2 minims (**0·03 to 0·12 Cc.**) gradually increased to 10 minims, if necessary, every 3 or 4 hours, in any aqueous vehicle.

Trinitroglycerin 1 part by weight, Alcohol (90%) *q.s.* to 100.

Dissolve. Sp. Gr. 0·840. 110 minims contain 1 grain. A colourless neutral liquid; 10 Cc. with an equal volume of water keeps clear, but the further admixture of 1 Cc. of water causes opacity (presence of full proportion of Glyceryl trinitrate). Diluted further, the latter separates in oily drops, which explode when struck with a hammer. Should be kept from sunlight. A 5% and a 10% solution in absolute alcohol are also prepared commercially but are not safe for use in dispensing. (**Spiritus Glycerylis Nitratis, U.S.,** has 1% by weight.) **U.S.** cautions that violent headache may be caused when freely applied to the skin. A little caustic potash solution should be poured over it to decompose should it be accidentally spilled.

For the Assay of Nitroglycerin in Solutions, etc., see Vol. II.

Incompatibility:—Nitroglycerin is decomposed by caustic alkalis. The alcoholic solution is also precipitated by water in excess.

In asthma $\frac{1}{2}$ to 1 minim doses with Spiritus Ætheris Nitrosi 20 minims every hour for 3 doses useful.—Haviland Hall, Tilley.

Haustus Nitroglycerini.

Nitroglycerin Solution 1 minim, Sodium Bicarbonate 10 grains, Compound Tincture of Cardamoms 1 drachm, Spirit of Chloroform 20 minims, Water to 1½ ounces. To be slowly sipped at first symptoms of an attack as restorative in angina pectoris.

Capsules (Gelatin) of Nitroglycerin.

Dose.—1 or 2. Contain $\frac{1}{100}$ grain in oil solution or more or less as prescribed.

Tabellæ Nitroglycerini, B.P. 1885. *Dose.*—1 or 2.

Introduced by the late William Martindale in 1878, $\frac{1}{100}$ grain in each. These tablets have the nitroglycerin in solution in chocolate, 2½ grains, in a perfectly safe and inexplosive, stable and non-volatile, portable and palatable form. The small bulk, precise dose, and quick action, if well masticated and swallowed, render this mode preferable for administering nitroglycerin.

Additional Strengths of Tabellæ.

The tablets are also prepared containing $\frac{1}{600}$, $\frac{1}{400}$, $\frac{1}{200}$, $\frac{1}{75}$, $\frac{1}{50}$, and $\frac{1}{25}$ grain, and 1 milligramme (1/64 grain) for prescribing in foreign countries. (For metric equivalents *see table.*) The tablets are non-poisonous even to children; a surgeon records that on one occasion two children, one three and the other six years of age, ate between them straight away two dozen, $\frac{1}{100}$ grain in each, without any injurious effects.

An employé in the author's laboratory (1905) ate a piece of the nitroglycerin mass weighing about 2 ounces, mistaking it for ordinary chocolate. A bad headache supervened, necessitating his lying down but he was at work again the following day.

Single doses of 5 grains and *daily dose* of 20 minims of Pure Nitroglycerin tolerated.—B.M.J.E. ii./05,52.

Uses of Nitroglycerin Tablets.—One tablet every three or four hours to relieve or ward off attacks of angina pectoris, asthma, sea-sickness, neuralgia, headache, epilepsy, and may be tried for Bright's disease and dysmenorrhœa. In tinnitus aurium has been found useful. A dose of any preparation of nitroglycerin acts more promptly if taken on an empty stomach. In arterio-sclerosis patients are made more comfortable by small doses for a week or two.

In sea-sickness there is a cramp of the vessels and anæmia of the central nervous system. The tablets are of benefit—symptoms quickly alleviated. Repeated doses can be given with perfect safety. Men on our battleships find them of service 'through the Bay.'

In asthma they are of immense value during a paroxysm, but it must not be forgotten the spasm may be of a compensatory nature and of value to the patient.

Should be carried about in the pocket to be taken immediately any pain comes on in the chest. These not only relieve pain but lessen the dangerous condition of which the pain is a symptom.

Tabellæ Trinitrini, Trinitrin Tablets (*B.P.* '14).

Tablets of chocolate, each weighing 5 grains (**0·3 Gm.**), and containing $\frac{1}{130}$ grain (**0·0005 Gm.**). *Dose.*—One or two tablets.

Tabellæ Nitroglycerini et Caffeinæ.

Dose.—1 every 4 hours or as required—each containing $\frac{1}{100}$ grain Nitroglycerin and 1 grain Caffeine; for use in migraine.

℞ **Tablettæ Nitroglycerini et Sodii Iodidi cum Arsenio.**

Dose.—1 in every four hours. Each equivalent to Nitroglycerin $\frac{1}{50}$ grain, Sodium Iodide 15 grains, with Fowler's Arsenical Solution 2 minims. This dosage may be considered a routine treatment of aortic disease. The quantity of Nitroglycerin employed is frequently too low, but the above may be given with perfect safety.

℞ **Tabellæ Nitroglycerini** $\frac{1}{150}$ grain (**0·0004 Gm.**) **et Strychninæ** $\frac{1}{25}$ grain (**0·0025 Gm.**).

Also { Nitroglycerin $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{100}$ grain with
Strychnine $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$ grain

In migraine Nitroglycerin, especially if in combination with Strychnine, is of value. It relieves headache almost immediately.

Its vasodilator effect lowers blood pressure in the peripheral vessels, and so reduces cerebral and arterial pressure.

In high arterial tension where the heart is beginning to fail and such symptoms as irregularity of pulse, giddiness, shortness of breath, or even œdema of ankles begin to appear, Brunton advised to combine cardiac tonics with Vasodilators. Rest is of utmost importance.

Tabellæ Nitroglycerini Compositæ.

Contain Nitroglycerin $\frac{1}{100}$ grain, Amyl Nitrite $\frac{1}{4}$ grain, Menthol $\frac{1}{50}$ grain, Capsicum $\frac{1}{100}$ grain.

Ⓟ **Tabellæ Anti-Asthmaticæ.** (H.).

Dose.—1 to 4 thrice daily.

Nitroglycerin $\frac{1}{200}$ grain, Sodium Iodide 2 grains, Potassium Bromide 2 grains, Fluidextract of Euphorbia Pilulifera 3 minims, Tincture of Lobelia 4 minims.

Very useful in asthma ; the nitroglycerin depresses the peripheral ends of the vagus nerves and stimulates the heart by removing the inhibitory action of the vagus and relieving blood vessels elsewhere.

Ⓟ **Tabellæ Digitalini et Nitroglycerini** *aa.* $\frac{1}{100}$ grain are also prepared *v.* Digitalin.

Tabellæ Nitroglycerini 1/100 and 1/200 grain **et Thyroidei Sicci** (Standardised—*Martindale*), $\frac{1}{2}$, $1\frac{1}{2}$ and 3 grains combine the action of these two remedies.

Tabellæ Natrico (Brunton-Thrush).

A proprietary remedy, each tablet containing Nitroglycerin 1/250 grain, Cratægus Oxyacantha 1 grain, Sodium Nitrite $\frac{1}{2}$ grain, Potassium Nitrate 2 grains. For lowering blood pressure. Cratægus Oxyacantha is known for its tonic action on the cardiac muscles.

References to use of Nitroglycerin.

Blood Pressure in Man.—

Maximum pressure at various ages in men, women and children. From 8 to 14 it is about 90 mm., from 15 to 21 it is 100 to 115 or 120 from 21 to 65 from 100 or 125 up to 135 or 150, above 65 it may stil be 135 to 150 or up to 200 or higher. In women it is about 10 to 15 mm lower than in men. In athletic men it may be about 10 to 15 mm higher than in moderate development. The cases in which low tension, below 100 in men and 80 or 90 in women generally are (1) weakness after some illness, especially in influenza (2) in commencing phthisis, (3) in heavy smokers.

In *lowered pressure* abundant food (animal), meat extracts, tonics as Iron, Arsenic, Malt, Cod Liver Oil, Hypophosphites, Glycerophosphates, and as cardiac tonics, Strychnine, Strophanthus, Digitalis and Caffeine are advised.

In Raised Tension.—High tension, especially in advancing age, though giving rise to sense of power and desire for action both physical and mental may be a danger signal. It is not only a direct cause of cardiac failure or ruptured vessels, but produces atheroma of the arteries, and thus weakening them renders them liable to break. By detecting the rise in time in middle life, tension may be kept down, changes in the arteries leading to arteriosclerosis and atheroma may be prevented and life prolonged.

Nicotine is almost the only drug which nearly equals Adrenalin in power of raising blood pressure. Tobacco, tea, and coffee must be prohibited.

Mercurials are beneficial, ½ grain or 1 grain of Calomel, or 3 to 5 grains of blue pill once or twice a week, followed by Saline. Potassium Iodide, in dose of 1 to 10 grains thrice daily useful. The Hippurates, Sodium Benzoate, Sodium Nitrite ½ grain, gradually increased to 4 or 5 grains, as also **Pulvis Sodii Nitritis Compositus**, *q.v.*, all tend to keep pressure down. **Nitroglycerin** and **Erythrol Nitrate** act similarly. A doctor was able to keep himself free from attacks of angina by daily use of Erythrol Nitrate for 3 or 4 years, beginning with ½ grain thrice daily, and gradually increasing it. When the pain is acute, **Amyl Nitrite** is the quickest means of relieving, or a little Chloroform as inhalation.

The influence of TOBACCO SMOKING as cause of arteriosclerosis is, however, not settled. Clinical writers are disposed to admit Tobacco as at least a predisposing cause, though many deny it.—F. W. Andrewes.

ANGINA PECTORIS, GASTRIC ORIGIN OF.—In certain favouring circumstances, tension of the gastric atmosphere is associated with painful attacks indistinguishable from those of angina pectoris. A case of flatulent dyspepsia developed seizures of a painful kind—in the upper intercostal nerves including the costo-humeral branch. Nitroglycerin effective—seizures always subsiding immediately.—B.M.J. i./11,613.

CARBON MONOXIDE POISONING.—$\frac{1}{100}$ grain injected, together with inhalation of Oxygen advised.—Pr., Dec., '08,842.

HIGH BLOOD PRESSURE.—Salines, exercise, Sodium Nitrite in 3 or even 5 grain doses, several times daily with a diuretic or diaphoretic. Amyl Nitrite or Nitroglycerin for temporary effect—should not be used too early. —J. Henderson, Glas. Med. Jl., April, '23,209, B.M.J.E. i./23,81.

A female *æt.* 47, melancholic in nature, for two years had an attack of hemiplegia, evidently hæmorrhagic, blood pressure rose to 170—180 mm. This was successfully reduced to 110—120 mm. by purging daily, and by Nitroglycerin and suitable feeding. Mental symptoms disappeared.—B.M.J. ii./11,1472.

High blood pressure. A Trinitrin tablet, in some cases, helps patient to sleep.—Sir H. Rolleston, L. i./23,521.

CHOREA.—Nitroglycerin may be given in full doses, and, if necessary, Morphine.

MIGRAINE.—Over 80% of cases completely controlled by taking tablets of Nitroglycerin (0·5 mg.) over a long period—half a tablet after breakfast, half after the midday meal, and in severe cases a third dose in the evening. Should be chewed, not swallowed.—Dollken, Münch. Med. Woch., Feb., 1928, per Pr., May, '28,334.

MENTAL DISEASE.—In certain cases depending on cerebral anæmia from vaso-constriction, Nitroglycerin produced rapid cure.—M.A., 1908,37.

MORPHINE CRAVING relieved.—L. i./09,1334.

In LOCOMOTOR ATAXIA may be given for long period, in increasing doses, relieving the crisis and lessening the pain.—B.M.J. ii./07,1823.

MYXŒDEMA has been treated with $\frac{1}{50}$ grain doses with purgings. In PUERPERAL ECLAMPSIA it is strongly recommended. Lowers blood pressure, and increases amount of urine. In epileptic vertigo, small doses relieve.

NEPHRITIS, ACUTE TUBULAR, ACCOMPANIED WITH DROPSY.—Nitroglycerin is valuable as in the following:—Trinitrin Solution, 32 minims, Potassium Acetate, 5 drachms, Compound Cardamom Tincture, 4 drachms, water to 8 ounces.

Dose.—½ ounce in water every three hours, until symptoms abate, and then thrice daily. Iron tonics to be given so soon as the urine is albumin-free.—J. T. Maclachlan, B.M.J. ii./23,473.

To reduce the vascular-tension in cirrhosis of the kidney.—Tirard.

NEURITIS, SUBACUTE, a case of, with general dropsy. Nitroglycerin in small doses increased the quantity of urine, and the dropsy disappeared completely in ten days.—B.M.J. ii./08,1670.

PAROXYSMAL TACHYCARDIA.—It is *the* treatment.—B.M.J. ii./04,109.

PNEUMONIA, ACUTE LOBAR.—Found to aid the action of Digitalis in cases with cardiac weakness—10 minims of Tincture of Digitalis with ½ minim of solution of Nitroglycerin every three or four hours. Especially indicated when the renal secretion is scanty, and the urine contains more than the usual trace of albumin.—Yeo.

PULMONARY HÆMORRHAGE.—The action of Nitroglycerin on pulmonary circulation does not justify its use and experimentally it appears to be contra-indicated in hæmoptysis.—Per Jl. A.M.A. ii./25,929.

SEA-SICKNESS. Recommended.—A. Sellheim, B.M.J. i./28,244.

SLEEPLESSNESS, where psychic or somatic excitement is the cause, endeavour to reduce the reflex excitability of the cord or lower arterial tension by Nitroglycerin or Bromides.—B.M.J. ii./13,1209.

Wounds caused by N.G. explosion; of peculiar churned-up and softened nature, probably caused by the escape of internal body pressure into the vacuum caused by the explosion.—J. L. Thomas, B.M.J. i./16,89.

Methyl Nitrate which is soluble in water to extent of 1 in 30 at 20° C., is 100 times less powerful than Nitroglycerin when given *per os*, and when given into the blood stream is about 15 times less.

NUTRIMENTA.

Discussion of the **Protein, Fat, Carbohydrate Inorganic Salts** *factors of Foods, consideration of* **"Amino Acids,"** *the* **Biuret Reaction** *for Albuminoids*, **Calorie Values, Yeast Extracts as** *Foods,* **Milk Preservation, Bread** *and* **Flour Standardisation,** *the* **Bleaching of Flour,** *and* **Injurious Admixtures to Flour** and other matters.—*See Vol. II.*

We are not self-supporting and would starve on our own resources in a short time. We are *forced to purchase the food offered* through existing commercial conditions—*not what we like.*—L. ii./30, 1237.

Beef can be brought, in consequence of refrigerating efficiency, from La Plata, 6,232 miles away, at an inclusive charge of 9/16d. per lb. (less than the cost of rail freight from Glasgow to London) in a condition that makes it practically indistinguishable from home-killed produce (but the taste is different. —W.H.M.). There are 14,000,000 acres in Argentina devoted to alfalfa grass of clover type. Crops are cut 6 times a year. The Rail System is British-owned.—B.M.J. ii./30,617.

Combinations of foods may give more efficient nutrition than single foods.—L. ii./30,976.

Preparations of Meat and Blood.

Meat is the best blood builder. ANÆMIC PATIENTS are often found to take very little protein, and marked benefit often occurs on addition to their diet of liberal quantities of meat.— P. McLester Jl. A.M.A. ii./29,1467.

Meat Extract is the product by extracting fresh meat with boiling water and evaporation. Contains not less than 75% of total solids. It should be practically free from Albumin. The yield from meat is about 3%.

Fluid Meat Extract is identical with above prepared by Liebig's original process, except that it is evaporated at lower temperature and contains not more than 75 and not less than 50% of total solids.

Meat Juice is the fluid portion of muscle fibre obtained by pressure or otherwise and may be concentrated at a temperature below the coagulation point of the soluble proteins. The solids contain not more than 15% Ash, not more than 2·5% NaCl (calculated from total Cl), not less than 12% N., not more than 4 or less than 2% P_2O_5. The nitrogenous substances contain not less than 35% coagulable proteins and not more than 40% meat bases.—Allen, 1914, Vol. VIII., p. 390.

Beef Extract Making. The meat is cut up and all tendons removed. It is then minced and boiled. After settling, the soup is skimmed to remove the fat. Next it is filtered and evaporated to 25 Beaumé, and it then contains 16% moisture. The whole process takes 5 days, and 10 lbs. beef gives 1 lb.—B.M.J. ii./30,617. *See also* S. Back, P.J. ii./31,361.

Nutritive effects of Beef Extract. The addition of beef extracts (commercial and home-made) to diet has been shown to increase weight.

Further references on the matter, Edn. XIX., p. 581.

Some Meat Extracts are fortified by additions of meat fibre, blood, albumin and other nutritious constituents.—(R. Hutchinson).—A. R. Tankard, P.J. ii./11,72.

✱ **Bovril** (T.M. 270031, 58405, 76548, 76549, 76861, Class 42, also 60501, Class 3.)

A combination of beef extract and finely powdered beef fibrin and albumen, widely used as a substitute for ordinary beef tea. Bovril was the commercial extract used in the investigation into the "nutritive effects of beef extract" referred to above.

Concentrated Beef-Tea.

A firm jelly, in tins and skins, contains the natural gelatin of the meat, and, diluted, forms a nutritious substitute for true beef-tea.

✱**Meat Juice** (Brand's.—T.M. 441825, Class 42).

A teaspoonful in a wine-glassful of water is a useful tonic. Is prepared by cold process resulting in retention of full activity of juice of the raw beef.

✱**Ferrocarnis** (T.M. 346870).

Dose.—One teaspoonful in water thrice daily with meals.

Described as a flavoured solution of iron in organic combination with concentrated raw meat juice. An Iron Tonic food.

Essence of Beef.

A soft, transparent, amber-coloured jelly, prepared from beef by exhausting with tepid water. It is agreeable to the palate and stomach of a delicate invalid; is useful in allaying obstinate vomiting. It is best taken cold by teaspoonsful. Similar essences are made from **mutton** and **chicken.**

Meat jelly is suitable for ulcerated stomach. Galatin is a powerful protein sparer, easily digested, and fixes a great deal of acid.

Beef, Chicken, Mutton and Veal Peptones are also prepared.

Restorative Essence of Beef is made from fresh beef, freed from fat, finely chopped up—1 pound mixed with distilled water 8 ounces; add 5 drops of hydrochloric acid, and 60 grains or less of salt; stir well and allow to macerate for 3 hours; strain. The product has an agreeable taste, and should be taken cold. *Dose.*—A wineglassful or more (Ringer). It is also prepared *Peptonised* by digestion with pepsin at the body temperature.

These are best freshly prepared for the patient, but may be preserved a resonable time by addition of formalin or chloroform.

✱**Eatan** (T.M. 426998, 427405).

An Essence of Beef, described as a liquefied form of liver and animal proteins.

Beef and Malt Wine.—Extract of Beef 4 ounces, Extract of Malt 8 ounces, Port Wine 1 gallon (Ph. Form.); or a Meat Juice and Liquid Extract may be used instead of the solid extracts.

A 'Beef and Malt Wine' should contain at least 0·18% of Nitrogen and Phosphorus equivalent to 0·12% of Phosphorus Pentoxide. Of 12 samples examined none contained these amounts.—B.M.J. i./24,919.

Further wines are mentioned in the Proprietary Medicine Chapter, *Vol. II.*

Meat Juices, Liquor Carnis and others.

Dark, reddish-brown liquids consisting of the expressed juice of meat concentrated at a low temperature *in vacuo.* A teaspoonful is added to 3 tablespoonsful of cold or tepid water, and taken in tablespoonful doses or more for sickness or exhaustion. Hot water coagulates the albumen.

Hæmoglobin. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

$C_{600}\ H_{960}\ N_{154}\ Fe\ S_3\ O_{179}$ (?) = 13339·740.

The principal constituent of red blood corpuscles. Is supplied commercially in reddish black powder or in scale form. May be given according to condition in cachet, capsule, or mixed with wine.

It is useful in ordinary secondary anæmia. Hæmoglobin solution gives a characteristic absorption spectrum and contains in organic combination iron equal to about ½%. *Cf. Vol. II.* for estimation in the blood and further details. It combines readily with oxygen, forming **Oxyhæmoglobin**, which is the substance known in trade as hæmoglobin.

In the arterial circulation, hæmoglobin is present as oxy-hæmoglobin (brilliant red in colour) the oxygen of which is given up to the tissues in its course, returning de-oxidised (dark-red) to the lungs by the venous system, where it is ready to take up fresh oxygen and so continue the process.

Hæmoglobin Capsules. Cantain 5 grains (**0·3 Gm.**).

Elixir Hæmoglobin. *Dose.*—1 drachm (**4 Cc.**) or more.

Hæmoglobin 10, Water 15, Aromatic Syrup (carefully neutralised), *q.s.* to 100 (approximately 5 grains in 1 drachm). An agreeably flavoured preparation of hæmoglobin as hæmatinic.

Elixir Hæmoglobin cum Lecithin.—*Dose.*—1 to 2 drachms.

As above with 3 grains of Lecithin per drachm added.

Nutrient Powder (Brand's).

On bread and butter or mixed with other food is very palatable—it retains the nutritive value of fresh meat.

Albumin Ovi Siccum, Ph. Ned. V., P. Jap. III. (now omitted).

Dose.—Ad lib. The molecular weight of albumin has been given as approaching 14,000. Yellowish, transparent, horn-like pieces obtained by evaporating white of egg at not exceeding 50° C. (the fresh white of egg is used as antidote in case of poisoning by mercurial and copper salts). Should be easily soluble in about 10 parts of water producing a neutral solution. Insoluble in alcohol and ether.

Incompatible with mineral acids, alcohol, mercuric chloride, tannin-containing preparations.

In hyperchlorhydria and in nervous disorders egg albumen is a food which binds and neutralises Hydrochloric Acid.

Albumin Water, for infantile diarrhœa and invalids in general. White of one egg mixed with Sterile Water 8 ounces, Sodium Chloride 5 grains or *q.s.* and a little whisky or brandy added.

Emulsifying agent for essential oils.——The following was found to be efficient: Egg Albumin powdered 1, Cream of Tartar 4.—P.J. ii./25,521. Emulsifiers.—J. Cofman-Nicoresti, P.J. ii./26,350,369.

Albumin Sanguinis.

Dose.—Ad lib. Made by inspissating blood serum. Brown horn-like scales, not so soluble in water as Egg Albumin.

Milk Preparations.

Under-consumption of milk. Viscount Astor points out that Canadians drink twice as much as English, and Americans three times as much. Dairying and livestock should be the cornerstones of British Agriculture. The number of Grades of milk should be reduced and revised. ***Position chaotic.***—L. i./31,771. *See also* D. L. Tucker, B.M.J. i./31,1137.

For a résumé of all the Enactments that have resulted from Parliamentary efforts since 1915, *in which year the* **Milk and Dairies (Consolidation) Act** *was passed (although it did not come into force until* 1925) *see Vol. II, q.v. also for Milk Analysis.*

Infant Feeding.

The Enzymes in fresh human milk are Catalase, Amylase, Butyrase, Lipas and Peroxidase while cows' milk contains, in addition, Perhydridase. W summarise the action of these and other Enzymes in a Table, see Vol. II.

'Upper Milk Feeding' for infants and invalids commends itself for certain reasons, 'Upper Milk' consists of the upper portion of milk that has stood in a cool place until a cream layer has formed. By diluting with water, or with water and whole milk, mixtures are obtained containing a high percentage of fat with a normal percentage of proteid. Upper milks are much superio to cream mixtures for feeding—the fat percentages are more uniform and the dilutions do not so readily separate as those employing cream.

Dried Milk.

Manufacture.—By spraying milk in a current of hot air or by heating over revolving cylinders. Hygienically and dietetically dried milk should be good. It is superior to condensed milk in protein and fatty matter.—S. Delépine.

✱**'Cow & Gate' Milk.** (T.M.'S numerous, Classes 14 & 42). In making thi the temperature does not rise above 98° C. form ore than about 3 seconds. It i ***not diluted with sugar,*** either Cane or Lactose. ***Some products contain as much as 30% to 40% of the latter added*** This is contra to the policy of the makers of an ***all-British product.***

Public Health (Dried Milk) Regulations 1923 *govern content o Milk Fat—vide Vol. II.*

Dried Milk is much used for **Infant Feeding.** The **'Hal Cream'** Milk is preferred by some authorities for the purpose, a being less rich. This contains perhaps only 1% fat. *B. Tuberculosi* is killed in the process of desiccation. For infant feeding and genera use are :—

Dried Full-Cream Milk is reconverted into milk by mixing 2½ ounce (5 heaped tablespoonful) with 1 pint of hot water.

Dried Half-Cream Milk. Employ 2¼ ounces (5 tablespoonful) to th pint of hot water.

Dried Separated Milk (containing 1% of its original butter fat) Employ 2 ounces (4 heaped tablespoonsful to the pint of hot water

In Feeding Trials with the Dried 'Full' and 'Half' Cream Mil on infants of the poorest class in London, diarrhœa was practicall absent throughout.

Dried milk is more easy of digestion. Infants are often unable t take fresh milk even in extreme dilution without recurrence of diarr hœa, yet can digest comparatively concentrated mixtures of drie milk. Get the child back again on cows' milk gradually. A teaspoon ful or less to be added to the Dried Milk at first and increased.

For infants, Milk in preference to Patent Foods. If Milk is cooke or pure dried Milk be used, fresh fruit juices or raw meat juice must sup plement.—From a lecture on Infantile Scurvy by T. D. Lister.

Disadvantages of Dried Milk in infant feeding. *Rickets common.* Babie often decidedly anæmic.—J. Burnet, Pr. Mar. 1921.

Good standard Dried Milk corresponds to the 3% Standard of the Boar of Agriculture and Fisheries. Where pure cow's milk is unavailable Drie Milk is a reliable substitute.—R. J. Blackham, Pr. May, 1921.

Protein balance in infant feeding. Combat of the idea that infants will no thrive on cow's milk unless they are given two or three times as much protein as is contained in woman's milk.—E. Pritchard, L. ii./22,44 ; see also R. Carter *ibid* 99.

National Milk Conference, speakers in general in favour of Dried Milk —L. ii./22,930.

Milk dried by the ***roller process*** has a greater amount of antiscorbutic vitamin than spray-process milk—E. Mellanby, B.M.J. i./24,895.

Dried milks found to vary in Vitamin B content, which may be slightly greater or slightly less than that of fresh milk, the variation not depending on methods of manufacture.—J.C.S. Ai./25,751.

Dried milk found to approximate more closely fresh cows' milk than evaporated (condensed unsweetened) milk.—G. A. Hartwell, B.M.J. i./25,1073. *See also* C. Maddock, B.M.J. i./25,1153.

Dried Milk made by the Just roller process rarely has ***bacterial content*** of more than 1,000 per gramme. The total bacterial count and the total count of hæmolysing colonies much higher in milk prepared by spray process than by roller process.—E. M. Bexby, Jl.A.M.A. ii./29,150.

✱**Lactogen** (T.M. 460158, 444575). **Nestle's Dried Cow's Milk**, to which Cream and Lactose have been added.—B.M.J. i./31,757.

Human Milk, Artificial.

New Milk 30, Cream $1\frac{3}{4}$, Milk Sugar $1\frac{1}{8}$, Water 18.

COW'S MILK, MODIFICATION TO BREAST STANDARD. The following formula is given:—Milk (of average quality) 10 ounces, Cream (33%) 1 ounce (or Cream 48%, $\frac{3}{4}$ ounce), Sugar (Milk Sugar at first, but later Milk Sugar, Maltose and Cane Sugar mixed) 1 ounce, Broth 4 ounces, water to 1 pint. The addition of broth has been found good.—E. Pritchard, L. i./22,838.

Humanised Milk.—CAN. FORM.

Triturate 100 grains of a mixture of Pancreatin 7, Sodium Bicarbonate 28, and Milk Sugar 965,—with Water 2 ounces and transfer to a bottle containing cows' milk 2 ounces, and cream $\frac{1}{2}$ ounce. Immerse this in water heated to 38° C. for $\frac{1}{4}$ hour. Afterwards bring to the boil.

Human Milk has the average composition:—Fat 3·4%, Milk Sugar 6·4%, Albuminoids 1·7% (Casein and Lactalbumen, *cf.* p. 582), Mineral Matter 0·2%. Notice the difference between the human milk and cows' milk (*Vol. II.*) in the relationship between the albuminoids and the mineral matter.

Mother's milk is an optimum diet for newly born infants; no substitute can be produced for this. The constituents of cows' milk may be re-arranged to make them present in proportions almost exactly similar to those in breast milk, but, however completely we may humanise cows' milk, it is not in our power to make it human, nor to give to its proteins the peculiar stamp of specificity.—A. E. Garrod.

Caloric bases of milk mixtures. The vast majority of milk mixtures used in infant feeding are as unlike human milk as they are unlike unmodified cows' milk.—G. F. Powers, per Jl. A.M.A. ii./25,1511.

Humanised milk liable to produce diarrhœa in infants.—L. i./24,867.

The calcium content of human milk is lowest for the first two weeks of lactation, rising gradually to a maximum during the first 4 months. During the first six months a ratio of CaO to P_2O_5 per 100 Cc. greater than 1 and approximately 1·3 is probably best for the child.—L. ii./30,93.

National Milk Conference.

Variations in chemical composition of milk. Morning milk of ten cows during a fortnight only reached 3% of fat once, while the evening milk was generally in excess of 4%.—B.M.J. ii./22,820.

If artificial feeding has to be resorted to, healthy cows' milk should first be tried; that known as '**Certified**' or else '**Grade A**' (**Tuberculin Tested**) may be more relied on than ordinary milk supply. (**Graded Milk** is dealt with in Vol. II.) As a general rule dilute with equal quantity of water. A grain of **Sodium Citrate** to the ounce will increase digestibility (5 and 10 grain **Tablets** are prepared *q.v.*),

Milk Sugar, a drachm to the pint, is also a useful addition. Fresh Milk is better than Pasteurised, but in case of doubt Pasteurisation or the use of **Dried Milk** (*q.v.*) or Condensed Milk (containing not less than 13% fat) should be considered. Of the last mentioned use 1 teaspoonful of the sweetened variety to 3 ounces of water, adding 1 teaspoonful of cream. (Condensed Milk should not be given after the child is 4 months old.)

Sodium Citrated Milk (2 grains to the ounce) makes whole milk feeding possible and removes necessity of diluting. Results equal to natural milk. —C. W. Vining, B.M.J. ii./15,457; see also R. D. Rudolph, *ibid*, p. 660.— Strongly in favour of undiluted milk heated in a jacketed pan for 40 minutes as advised by Budin, with addition of Sodium Citrate.

If none of the above are digested, **Peptonised Milk** must be given employing **Peptonising Powders** or **Liquor Pancreaticus** (*q.v.*). **After the child is six months old** a Malted Food may be given as a supplementary food, *but farinaceous foods of all kinds should be discouraged until the child has teeth.*—R. Hutchinson.

Infants' Food 'A' for children up to three months contains all the Milk Solids prepared with aseptic precautions. Three to five heaped tablespoonsful to be added to a pint of water which has been brought to the boil (and kept boiling for fifteen minutes), and allowed to cool down slightly in a covered jug. When mixed for use, it is similar in composition to human milk.

Food 'B' for Infants (from three to six months) **and Invalids** contains the milk solids with a small proportion of cereal carbohydrates treated to render them assimilable. Prepared for use as the latter.

Food 'C' for Infants (from six months and upwards) **and Invalids** similar to 'B' with a larger proportion of farinaceous constituent Five heaped tablespoonsful to be used to the pint of water as above.

Cocoa Food is also prepared.

Biscuit Foods.

Biscuit Powder 1½ lbs., Baked Wheat Flour 1 lb., Finest Ground Oatmeal 6 ozs., Milk Sugar 6 ozs., Powdered Malt 8 ozs., dried at a low temperature and mixed.

A better way is to bake into a biscuit the mixture of wheat flour, fine oat meal and milk, then grind up and mix with the powdered malt.

Another formula is :—Baked Flour 1 lb., Biscuit Powder 1 lb., Refined Sugar in powder 1 oz, Milk Sugar 6 ozs., Finest Oat Flour 8 ozs., Powdered Malt 4 ozs.—Note Hutchinson's remarks, *sufra.*

***Frailac** (T.M. 508494, *Cow & Gate*).

A reconstituted milk specially devised for frail and premature babies.

***Hemolac** (T.M. 487114, *Cow & Gate*).

Full Cream Milk Powder containing 31½ grains (0·45%) **Iron Ammonium Citrate** to the lb. For prevention of anæmia in infancy.

***Brestol** (T.M. 475867, *Cow & Gate*).

'Humanised Cream,' plus **Cod Liver Oil** and concentrated **Orange Juice**. As substitute for dairy cream and Cod Liver Oil emulsions in cases of fat intolerance and in backward and underweight babies, also in marasmus and tuberculosis.

***Lacquin** (T.M. 483703, *Cow & Gate*). **Quinine Milk Powder. Tropical** tasteless tonic food. 1 teaspoonful = 2½ grains Quinine.

***Lacidac** (T.M. 483501, *Cow & Gate*).

A dried milk with addition of 1 drachm **Lactic Acid** B.P. to 1 pint of milk. Made in two strengths: Separated (1% fat) and Half Cream (16% fat), the optimum dilutions being respectively 1 to 9 and 1 to 8 parts of boiled water. In convalescence, marasmus, eczema, diarrhœa, and vomiting.

Half Cream Foods (*Cow & Gate*).

A Milk Powder modified with added Lactose and resembling breast milk in the non-fatty solids. In the nervous dyspepsias of infancy and in cases of fat intolerance.

Pasteurisation of Milk.

The two principal methods employed are (1) the *Flash Process*, in which the milk is usually distributed by centrifugal force round the inner surface of a cylinder at a temperature of 72 to 84° C., and (2) the *Holder Process*, in which the milk is maintained at about 65° C. for half an hour and then rapidly cooled. Above 65° C. deleterious changes occur. This method is usually regarded as the most reliable. The consensus of opinion is that few tubercle bacilli survive 60-65° C. for 30 minutes and those escaping destruction have their virulence impaired.

Ministry of Health Order, 'Milk (Special Designations) Order, 1922.'—PASTEURISED MILK must have been heated at a temperature of 145° to 150° F. for ½ hour and then cooled to 55° F.

The 'Flash' method of pasteurising is entirely replaced in U.S.A. by the 'holding' method in which the Milk is kept at 145° F. for 30 minutes.—L. i./22,930.

Amongst the diseases for which milk acts as a vehicle are tuberculosis, diphtheria, typhoid fever, paratyphoid fever, dysentery, scarlet fever, Malta fever, infective sore throats, epidemic diarrhœa, cholera and food poisoning, and less frequently foot-and-mouth disease and anthrax.—W. G. Savage, B.M.J. ii./25,244.

Complete safety from milk infection is impossible unless milk is rendered sterile of pathogenic organisms immediately before consumption, *i.e.*, by home pasteurisation or scalding. For relative safety, commercial pasteurisation is the only solution.—E. Pritchard, B.M.J. ii./25,245.

Pasteurisation of milk is of advantage to the dairyman rather than to the consumer. On keeping raw and Pasteurised milk, the bacterial count in the latter found far greater than in the raw milk. As to antiscorbutic properties, Plimmer has shown that re-heated Pasteurised milk contains none.—T. McLachlan, L. ii./26,878.

Recent Opinions on Pasteurisation of Milk.—Where practised, infection traceable to milk recedes to vanishing point.—Lord Dawson of Penn and 8 other signatories, L. ii./30,1315.

Tampering with one of Nature's foods may be ***putting the clock back.***—C. Maddock, L. ii./30,1367.

No raw milk—Certified or other—is safe.—Prof. J. C. G. Ledingham, L. ii./30,1368.

What advantage would accrue if Pasteurisation of Grade A (Tuberculin Tested) were made compulsory? The advantage to wholesale Pasteurising firms is, of course, obvious.—D. M. Connan, L. ii./30,1368.

Lord Moynihan says: "Every drop of milk taken into my house is boiled as soon as it is delivered. The nutritive value of milk, contrary to general opinion, is not in the least diminished by boiling."—House of Lords, Feb.,'31.

Consumption of milk in this country lamentably small (? natural instinct for self-protection.—W.H.M.). Pasteurisation does not impair the nutritive value.—D. L. Tucker, B.M.J.i./31,1137.

"Flash" principle (as carried out at the **Middlesex Hospital**) the better method. "Pasteurised" milk supplied by a well-known firm often found to have a ***bacterial content of several millions.*** Discrepancy due to the media used—a richer medium should be used for routine analyses than that recommended by the Min. of Health. Provided the milk is clean the richer medium still gives results within present legal standards. Trouble due to ***thermophilic and thermoduric organisms.*** which may actually ***be increased by pasteurisation.*** To hide dirty methods, farmers heat milk before sending it to be pooled. Pasteurisation as generally used at present is ***not the last word*** in the provision of clean, wholesome milk.—J. McIntosh and L. E. H. Whitby, L. ii./31,148.

At the **Bladen Dairies (Dorchester)** milk is collected from some 90 farms, is immediately pasteurised, cooled, and packed in cartons, and is on sale ***in London 24 hours*** after cow is milked.—L. ii./31,1087. It could be done ***far quicker i.e., within 8 hours,*** by adopting the ***writer's suggestion of*** refrigeration on the farm and delivery in ***thermo-isolated containers.*** See Vol. II., XIX., p. 483.

Vitamin value of milk Pasteurised at 145° F. for 30 minutes is undamaged.—Evelina Hospital observations, P.J. i./30,321.

If Vitamin C is destroyed in Pasteurised milk add a teaspoonful of fruit juice.—United Dairies, L. i./30,1382.

Boiled versus Unboiled Milk.—Experiments on animals fed with milk of another species. Such small differences as were found in the nutritive values of raw and boiled milk were in **favor of boiled milk.**—L.G.B. Report.

Milk boiled at home for 2 to 5 minutes is in every way to be preferred to fresh or commercially pasteurised milk.—J. Brennemann, per P.J. i./17,23.

For further data on Pasteurisation, especially with regard to B. tuberculosis, see Vol. II.

Pasteurisation causes changes which considerably reduce the dietetic value of milk. Probable partial destruction of Vitamin B_1.—E. C. V. Mattick and J. Golding, L. i./31,667.

Milk containing **Lactic Acid 0·5%** was a satisfactory routine food in the majority of 50 infants aged from 1 day to 6 months in which it was tried. The advantages claimed are ease of preparation, relative sterility, and greater digestibility and caloric value. It should not be used in cases of anhydræmic acidosis until the acidosis has been overcome.—J. A. Stephen and E. R. C. Walker, L. ii./27,65.

Condensed Milk standardised under Ministry of Health—(L. i./23, 972, ii./23,529. *Further Data from Food Investigation Board,* see Vol. II.), Labels to state clearly the types. The composition to be :—

	Milk Fat.	Total solids, including Fat.
Full cream unsweetened .	9·0%	31%
,, ,, sweetened ...	9·0%	31%
Skimmed unsweetened	—	20%
,, sweetened ...	—	26%

✱ **'Berna'** (T.M. 468128) **Condensed Milk** contains apparently less cane sugar than the average, hence Fat content correspondingly higher.—Pr. Mar. 22/227.

Milk contains more calcium than lime water. Milk is, therefore, of value in hæmorrhage—where it is desirable to increase the calcium in the blood—also in many forms of pneumonia. Butter-milk is useful in typhoid and in gastro-intestinal disorders of children.

In post-partum hæmorrhage ½ to 1 litre of milk by rectal injection is good as a hæmostatic.

Whey Powder.

This is Desiccated Milk deprived of fat and Casein. It has average composition: Soluble Lactalbumen 14·25, Milk Sugar 74·45, Fats 0·27, Mineral Matter, chiefly Phosphate 9·8, Moisture 1·2%. It is employed in conjunction with cows' milk for producing a milk with a reduced proportion of Casein, and also of higher Sp. Gr., with the result that the amount of fluid is proportionally lessened. Or it may be prepared with water and cream,—the cream being low in Casein, sugar and ash, but high in fat, whilst the whey is low in fat, but high in ash, sugar and lactalbumen. It may also be used alone to produce Milk Whey by dissolving in water.

Human Milk contains on an average 0·8% Casein and 0·6% Lactalbumen; **Cows' Milk** 2·7% to 3% Casein and 0·2 to 0·3% Lactalbumen. *Cf.* also p. 579 for other constituents and *Vol. II.* In diluting Cows' Milk with water to reduce the Casein content it is obvious that the deficiency in Lactalbumen is rendered still more in error.

It is also clear, if the preceding figures be correct, that a breast-fed child taking 1,000 Gm. of milk in a day, will receive 6 Gm. of

Lactulbumen. *A child receiving, say,* 600 *Gm. of Cows' Milk would receive only* 1·8 *Gm., at most, of the same albumen. This lactalbumen is soluble i.e., it does not undergo precipitation with acid and digestion with pepsin and pancreatin before assimilation.*

Arguing by analogy with the high albumen content in Colostrum which the newly born calf receives (*cf. Vol. II.*) the advocates of Lactalbumen, as an addition to cows' milk for infants' milk, claim that it is important to supply the infant with a form of protein which makes small demand on the digestive glands, and which does not require much transformation before it can be absorbed.

Koumiss (Artificial). *Syn.* ✱KEPHIR (T.M. 298465, **Class 42**).

Dissolve Grape Sugar ½ ounce in water 4 ounces, and add 20 grains of yeast and cow's milk 4 ounces. Place in a quart bottle and fill up with milk, cork and wire. Keep it cool and shake it frequently during four days. Koumiss thus prepared contains some alcohol (1 to 2%) and lactic acid (about 1 to 2%). The original Koumiss of the Tartars was made from mare's milk by using the peculiar Kephir ferment, which swells up on soaking in milk. This consisted in reality of yeast cells with certain bacteria (*B. Caucasicus*, Kern).

In some respects it resembles mother's milk more than cow's milk.

Uses.—A food used in the Caucasus as a stimulant in exhaustion and in convalescence of phthisis. Was recommended by Metchnikoff as a nutritive and as an intestinal antiseptic. *See also Acidi Lactici Bacilli, this Vol. & Vol. II.*

Goat's Milk.—This appears to lie between human and cow's milk. It is recorded that a baby of seven weeks received 3 ozs. a day, the amount being increased as the natural supply failed, until at three months it was taking six feeds a day of 4 to 5 ounces each and nothing else—the milk was given straight as it came from the goat. Digestion was perfect and there was a gain in weight increasing from 3 to 4 ounces to from 6 to 8 ounces each week. A first class food requiring no preparation. The fat is both in large proportion and in finer globules. Not only do goats not suffer from tuberculosis, but their milk has a wonderful effect on children, especially on such as have to be brought up artificially and with whom cow's milk disagrees.—Brit. Goat Society.

Casein Preparations.

Casein is the principal albuminoid constituent of milk and is present in solution in the aqueous portion of the milk as an alkali-albuminate, probably as a calcium compound (the alkali in milk is about 0·5%). Some hold that Casein exists as Caseinogen, and that this is converted into Casein by ferment. It is precipitated by dilute acids (*e.g.*, acetic acid, which is utilised in method of estimation, *v. Vol. II.*). Casein is furthermore precipitated action of the **rennet ferment.** Casein is present in milk to the extent of 3 to 5% (usually about 3½%). Once thrown out of solution it is not readily dissolved again except with added alkali or hydrochloric acid. **Cheese** is casein with a considerable proportion of fat.

Flocculent Casein, *see* Casumen, *infra* (specially prepared) is however, soluble in water.

✱**Plasmon** (Trade Marks numerous in Classes 3 & 42), a soluble milk albumin (Casein). Nutritive and easily digested. Plasmon Biscuits, Arrowroot, Cocoa, and Chocolate are prepared.

Contains Phosphorus in organic combination to extent of 1·46%. Total Phosphoric Acid found was 2·88%. Milk protein differs from other proteins in containing Phosphorus in combination.

For gastric ulcer, this and similar foods are much employed.

CHRONIC DIARRHŒA in breast-fed infants cured, without weaning, by giving a teaspoonful twice or thrice daily in water or milk for 6 or 8 weeks.—J. Gibbens. L. i./32,289.

✱**Casumen** (T.M. 239,245). A soluble form of Casein (Flocculent Casein containing a very high percentage of protein (90%). For use in all cases where there is poor nutrition. It contains practically no fat or sugar. It may be mixed with cocoa, chocolate, bread (10%) for diabetics, etc.

Soluble and other Caseins, Modes of Making.—P.J. ii./12,155.

Pigmentum Casein (was in St. M.'s H.). *Syn.* **Unguentum Caseinæ**. Casein 14, Potassium Carbonate ½, Glycerin 7, Vaselin 21, Zinc Oxide ½, Pheno ½, Water to 100. If good Casein be used we find this is almost too thick—add a little more water. A basis for skin medicaments. Thymol *q.s.* may be added to preserve it.

Proprietary Foods in Infant Feeding.

Many proprietary Infants' Foods are *deficient in fat*. This may provide partial explanation of the characteristic liability to infection so frequently seen in fat but pasty babies reared on this type of Food—J. C. Drummond, L. ii./18,482. *cf.* Vitamins

Proprietary Infants' Foods are thus classified :—

1. Foods with a basis of dried cow's milk but mixed with flour.
2. Foods consisting mainly of flours, the starch of which is practically unaltered or altered only by heating.
3. Foods consisting mainly of flours mixed with a proportion of malt flour or malt extract, but containing much unaltered starch which is not converted into soluble products during the process of preparing the food for infants in accordance with the directions given on the package.
4. Foods containing flours, but also containing active diastase or pancreatic ferment, so that if the food is carefully prepared according to the directions on the package the starch is appreciably altered.
5. Foods manufactured from flours, the starch of which has been mainly or partially converted into soluble products during the course of manufacture.

The observation is made that most proprietary foods are deficient in fat and also in fat-soluble factor, whilst a number are also stated to be inadequate with respect to the water-soluble factor, and all are deficient in the anti-scorbutic factor.—From Med. Res. Com. Report, per C.D. Feb. 14, '20. *See also* Roy. Soc. Med. Discussion, L. i./20,604.

Proprietary Foods and Milks. A good summary, including Allenbury's Food, Mellin's, Horlick's and a number of nitrogenous foods.—E. Cautley, Pr. July, 1922.

Investigations of 106 foods a few years ago carried out by F. J. H. Coutts and J. Baker for the Local Govt. Bd. are referred to by H. C. Cameron, B.M.J. ii./15,287.

✱**Glaxo** (T.M. 364394, 433121, Class 3 and numerous in 42).

This infants' food is a dried milk containing added Lactose. In addition to the standard Full Cream Glaxo there are issued, No. 1 or half cream and No. 2 or three quarters cream. The Full Cream contains approx. 25·5% Fat and 42·5% Lactose, the 'No. 1' 15·8% Fat, 49·2% Carbohydrates, the No. 2 20% Fat and 45% Carbohydrates. The Carbohydrates in Nos. 1 and 2 consist of lactose with nearly 10% Cane Sugar.

✱**Savory & Moore's Food** (T.M. 255039, 329754, 334627) is stated to contain the active enzymes and vitamins of malt. It contains no dried milk. In preparing it for use it is not heated sufficiently to impair vitamins or enzymes. When so prepared it approximates mothers' milk.

✱**Vitafer** (T.M. 324675, 333647, 347470).—A tonic food.

Dose.—Two teaspoonsful three or four times daily mixed with milk porridge, cocoa or any fluid food. For children under 10 three teaspoonsful daily; infants proportionately.

The "Lancet" found Protein not exclusively Casein as some is present as Milk Albumin. Moisture 6·3%, Mineral Matter 10·7%, total Protein 80·4%, Fat 2·6%. Total Phosphoric Acid as Glycerophosphates 3·84%.

✱ **Almata** (T.M. 424829).

Described as a complete food. It has a butter value approaching that of human milk.—L. i./24,793.

It is made from egg-yolk, butter, malto-dextrins, and decitrated fresh fruit juice and contains the needed mineral constituents. Reports show that in practice the food has many advantages.—B.M.J. ii./25,910.

It is claimed that the percentage of fat absorption by infants fed on Almata is as high as that of breast milk fat and that percentage calcium absorption is relatively high. It is also of value as a galactagogue and an invalid food.—B.M.J. ii./27,780.

Rationale of Infants' Foods.—F. Roles, P.J. ii./31,357.

Other Food Preparations.

✱**Benger's Food** (T.M. 321220 and others). A wheaten flour preparation containing Trypsin and Amylopsin. It is used with fresh milk or milk and water. It gives nourishment with complete or partial rest to the digestive system. The point of the preparation is that if the digestive system, however weak, can do any work at all, it should be given it to do to the extent of its power. The fat may be increased by adding cream or upper-milk.

✱**Peptalac.** (T.M. 501397, *Cow and Gate*).

Pancreatised Milk, Dextrinised and Pancreatised Wheat. Prepared by Roller Process, retaining full mineral and Vitamin content with freedom from pathogenic organisms. For use where powers of digestive tract are deficient.

✱**Glax-Ovo** (T.M. 450299 and 450186).

Described as a tonic food beverage. A palatable, readily-prepared, easily-digestible food. It contains Ostelin.

✱**Lacto-Dextrin.** A Carbohydrate food, with a high caloric value. Contains 73% Lactose and 25% Dextrin.

Gluten.—*Syn.* VEGETABLE ALBUMEN. A protein mixture obtainable from wheat flour as an elastic mass when moist.

Preparation.—Knead flour with about half its weight of water to produce a stiff dough. Knead further in running water till free from starch. Wheat Protein is digested in less time than the majority of animal proteins.

✱**Energen Bread (T.M. 337793, 524836.)**

Contains 40% Protein and only 46% Starch. Its caloric value is 108 Cals. =1 oz. (ordinary bread 75 Cals. =1 oz.). Energen Bread and Breakfast Food (Bismeal) are rich in Protein and much reduced in Starch, and are of value in cases requiring strict dietary.—E. Browning, 14/3/1930.

(*The subject of Bread is dealt with for the most part in Vol. II.*)

NEM. (NÆHRUNG'S EINHEIT MILCH). A unit used by Von Pirquet. The energy contained in 1 Cc. of milk. It is based primarily on calorimetry, aided by calculations which deduce the energy requirements of an individual from his body weight and his sitting (not his standing) height. A dietary is based upon it.—Sir Gowland Hopkins, L. i./21,3.

DIABETIC FOODS.

Starchless Bread (both brown and white) also Biscuits and Flour are manufactured. These are generally **Gluten Products** (more or less free from Starch) and Bran foods. Previously they were the only foods available for diabetics. **Casein** (with eggs and butter) has latterly been employed. Casein bread and biscuits (Callard & Co., London) are free from Carbohydrates and are palatable.

It is best to give this casein bread with a weighed quantity of starchy bread when desired. 'Gluten Bread' may contain as much as 55% of starch. It *can* be made with 7% of starch, but it is not palatable.

Home made Diabetic Bread from milk Casein of separated milk with addition of egg white, Salt, Cream of Tartar, etc., as used a Duff House.—E. Spriggs, B.M.J. ii./21,707, L. ii./21,960.

The **Iodine Test** is useful for the detection of Starch in so-called Starch Free Foods and should be applied in cases of doubt. A deep *violet* indicates *unaltered starch*; partially altered starch will give a brownish colour. We were informed that many Continental Diabetic Foods offered for their palatability actually contain a *higher proportion of Starch than ordinary white bread.* Almonds and other nuts are also used for making bread and biscuits. Various **Sugarless Condiments,** foods and drinks are prepared. Saccharin is used as the sweetening agent.

Sugar-free Milk for Diabetics.—Prepared by a process of separating and washing with warm water, using a dairy cream centrifugal separator. Pour a gallon of cream into a 10-gallon can, fill with water at proper temperature for skimming, and thoroughly stir. Adjust separator to deliver 1 part out of the original 10. The cream is separated and the reservoir and separator bowl rinsed, while still running, by adding more warm water. On repeating the process the cream becomes sugar-free. Flavour restored by addition of salt (0·5–0·7%) and a little Saccharin (added just before serving).—Jl.A.M.A.,1921,76,792, per Y.B.P., 1921,265. The Casein and Salts might also be added back.—W.H.M.

The following lists may be useful in assisting the Selection of Foods for Diabetics :—

(i) ***Foods free from Carbohydrates*** or containing less than 1%—Beef, Mutton, Lamb, Pork, Poultry, Game, Sweetbread, Tongue, Fish, Turtle, Lobster, Eggs, Butter, Cheshire, American, Dutch and Gorgonzola Cheeses, Lard, Gelatin and 'honest' Starch and Sugar free special foods.

(ii) ***Foods containing a low proportion of Carbohydrates*** (percentage of Carbohydrate is indicated).—

Liver 1, Sausage (Pork) 1, Crab 1, Crayfish 1, Scallops 3, Asparagus 3, Celery 3, Cucumbers 3, Lettuce 3, Spinach 3, Oysters 4, Mussels 4, Stilton Cheese 3, Cheddar 4, Rhubarb 4, Tomatoes 4, Mixed Pickles 4, Cauliflower 5, Leeks 6, Radishes 6, Mushrooms 7, Water Melons 7.

(iii) ***Foods rich in Carbohydrate***—Milk 5 or more, Whey 5, Oatmeal (thin gruel) 6, Strawberries 7, Turnips 8, Carrots 9, Beet (fresh), Cranberries and Pineapple 10, Oatmeal (boiled), Blackberries, Dried Peaches 11, Oranges 12, Parsnips, Apricots, Currants, Walnuts and Filberts 13, Apples and Pears 14, Macaroni (cooked) 16, Calves Foot Jelly, Artichokes, Peas (Green), Cherries and Almonds 17, Potatoes and Pears (dried) 18, Figs and Grapes 19, Plums 20, Boiled Potatoes 21, Bananas 22, Rice (boiled) 24, Tapioca Pudding and Cocoa-nuts 28, Chocolate 30, Mince-pie 38, Chestnuts (fresh) 42, Apple Pie 43, Bread (Brown) 47, Potatoes (fried chips) 47, Bread (White) 53, Rolls 56, Lentils (dried) 60, Bread (toasted) 61, Peas (dried) 62, Gingerbread 63, Macaroons 65, Sponge Cake 66, Oatmeal 67, Chestnuts (dried) 74, Sago 78, Tapioca 88, Arrowroot 97, Dried Fruits, *i.e.*, Apples, Apricots, Currants, Dates, Figs, Prunes, Raisins 62—78, Meal Flour, Rice, Macaroni, Vermicelli 70—80.

In the case of list (ii) much of the Carbohydrates in some of them is in the form of Cellulose, which is not absorbed.

The majority of the above figures are from the analyses of Atwater and Bryant.—L. ii./11,1184.

The Carbohydrate Content of common British fruits and vegetables.—M.R.C. Sec. Rept. Series, No. 135, L. i./29,1264.

ACCESSORY FOOD FACTORS.

The original work of Sir F. Gowland Hopkins in 1912 paved the way for a vast amount of research, and although the chemical constitution of these bodies, to which the name **Vitamin** was originally given by Funk, remains ill-defined, knowledge of them since our last Edition has advanced to the extent that certain standards have been agreed upon.

Recommendations of the Permanent Standards Commission of the Health Organisation of the League of Nations. (London, June, 1931.)

Vitamin A.—**Carotene** to be adopted temporarily (pending further investigation as to stability) as International standard, with selected Cod Liver Oil as second provisional standard. International standard to be made from samples of pure Carotene prepared in specified laboratories by Willstatter's method, and unit to be the Vitamin A potency of 0·001 mgr. of resulting mixture.

Vitamin B.—The absorption product of Vitamin B prepared in the Medical Laboratory, Java, by Seidell's method, the unit being the anti-neuritic value of 10 mgr.

Vitamin C.—The Vitamin C activity of 0·1 Cc. of fresh lemon juice.

Vitamin D.—Irradiated Ergosterol (as issued by the Nat. Inst. Med. Res.), the unit being the Vitamin D activity of 1 mgr.

All Standards to be kept at the National Institute for Medical Research, Hampstead.—B.M.J. ii./31,863.

Crystalline products of high activity obtained.—Prof. A. Windaus, R. B. Bourdillon and others, B.M.J. i./31,1116.

By eliminating preparations containing Vitamins from the diet in animal experiments it can be shown that they are essential to growth and freedom from disease, for example, an animal fed merely on pure protein, fat, the carbohydrates and the inorganic salts of food, will die within a short time.

The four important Vitamins now defined are A, B, C, and D. An additional fat-soluble factor, Vitamin E, has been proved by animal experiments to be necessary for satisfactory reproduction.

Vitamin deficiency diseases are beri-beri, pellagra, scurvy and rickets. Obscure and apparently trivial complaints are probably also to be included.—Prof. Halliburton. For notes on treatment with substances rich in Vitamins see p. 590.

The chief sources and properties of the Vitamins, with the results of animal experiments, are summarised below, but for *more detailed information and abstracts from the literature Volume II.* should be consulted.

Vitamin 'A.' *Fat Soluble.* **The Growth-promoting** also known as **Anti-infective Factor.**

Absence of the 'A' Factor, where such foods as milk, butter and eggs are not available, has been proved to be the fore-runner of diseases of malnutrition.

The total absence of any of the factors in either Lard, Vegetable Oils, Margarine and White Bread is a serious contemplation. The majority of animal fats—fish oils in particular—contain a fair proportion of 'A' factor. *Cf.* E. Mellanby, L. i./19,407.

Occurrence.—Cod-Liver Oil +++, Cream ++, Green Vegetables ++.

Bananas contain Vitamin A, in addition to B and C.—B.M.J.E. ii./24,64.

Puerperal septicæmia and acute rheumatism may be related to Vitamin 'A' deficiency.—H. N. Green and G. Mellanby, B.M.J. ii./28,695.

Hitherto Vitamin B has been considered the only vitamin to play an important part in maintaining the health of the nerves, but it is now shown that ***Spinal Cord Degeneration*** follows on deficiency of Vitamin A.—L. ii./31,918.

Vitamin A is present in any liver oil.—M.R.C. Report, 146, B.M.J. ii./30,221

'A' and 'D' are the only two vitamins about whose chemistry we have any solid knowledge and it is obvious how incomplete their story still is.—L. ii./31,1308.

Carotene, exact relation of, to Vitamin A is, to some extent, problematical. When from liver oils obviously Carotene is not responsible.—L. ii./30,417.

Significance of Carotene—L. i./29,499 ; ii./29,392.

Carotene—anti-infective function, etc.—B.M.J. i./30,1013.

Carotene as a source of Vitamin A.—E. M. Hume and I. Smedley-Maclean, L. i./30,290. The parent substance, Cholesterol also has claims.—L. i./31,768.

Evaluation of foods might be standardised against value of Carotene.—E. M. Hume and H. Henderson Smith, L. ii./30,1362.

Though not identical with Carotene, active Vitamin A preparations when ozonised also produce Geronic Acid. The Vitamin A of Cod Liver Oil must therefore contain in its molecule the same carbon ring as Carotene and could ***therefore be deemed a derivative of it.***—Prof. P. Karrer, B.M.J. ii./31,622.

The substance isolated by Karrer, and also by Drummond and Co-workers, was obtained from halibut-liver oil which is vastly richer in Vitamin A than that of the cod.—L. i./32,251.

The purified product still produces toxic effects when given in excessive doses.—B. M. J. i./32,144.

For Methods of Colorimetric Estimation of 'A' see Vol. II.

Stability of Vitamin A. This Vitamin resists temperatures of 100° and probably 140° C., but it may be destroyed by oxidation.

Vitamin 'A' can be obtained in a concentrated form by separation of the unsaponifiable portion of Cod-Liver Oil (*q.v.*).

Vitamin 'B.' *Water Soluble.* **The Anti-Neurotic Factor.** This is removed in rice polishings and its absence has been proved to cause beri-beri. *See* Vol. II.

In ordinary human diet, out of 3 lb. of food, only about 6 oz. contain significant quantities of Vitamin B : ordinary daily diet seriously deficient in Vitamin B, but the consequent tendency to intestinal atonia somewhat counterbalanced by widespread use of purgatives.—B.M.J. i./26,239.

Vitamin B is important during lactation.—G. A. Hartwell, L. ii./24,956.

Occurrence.—Seed Germs, Yeast and Nuts +++ ; Meat and Milk +.

Stability. Comparatively stable at 100° C. and not easily oxidised. Slowly destroyed at 120° C.

The dual nature of 'B' is dealt with in Vol. II.

Vitamin 'C.' *Water Soluble.* **The Antiscorbutic Factor.** Lack of this Vitamin results in scurvy.

Occurrence.—Cabbage, Lemon and Orange Juice +++, Meat and Milk +.

The substances regarded as richest in this vitamin include raw fresh green cabbage leaves, swede juice, sprouted cowpeas, grape-fruit juice, lemon juice (fresh and dried), naarjte juice, orange juice (fresh and dried), raw tomato, tomato

juice (tinned). Grapes have very low anti-scorbutic value. South African tomatoes much less potent than those grown in England. Milk by no means rich in Vitamin C.—Spec. Rep. Med. Res. Council, L. i./24,364.

Stability.—Gradually destroyed above 50° C.

Vitamin C is very sensitive to oxidising agents. Addition of either acid or alkali to water in which vegetables are boiled appears to increase loss of antiscorbutic property.— Spec. Report, Med. Res. Council, L. i./24,364.

Vitamin (Antiscorbutic) Tablets, made by the late Sir P. W. Bassett-Smith's method (L. i./20,1102 ; ii./20,997 ; *see also* B.M.J. i./25,377,385), stored for over 12 months, were proved to have retained their efficacy, while fresh lemon juice imported from Messina, with and without Potassium Metabisulphite had no antiscorbutic power.

Anti-scurvy Vitamin in Apples.—Closely related fruits vary. As to apples Bramley's Seedling (a cooking variety) is richer than others. Roasting apples in their skins destroys the vitamin to a negligible extent.—M.R.C. Report, 146, B.M.J. ii./30,221.

Vitamin 'D.' *Fat Soluble.* **The Antirachitic Factor.** The observation that rickets could be cured by ultra-violet light did not appear at first to agree with the theory that rickets was a Vitamin-deficiency disease. It has been shown recently, however, that not only irradiation of the skin, but also irradiation of the food has an antirachitic action. Based on these results preparations containing this factor have been manufactured, usually by treatment of cholesterol or a similar alcohol with ultra-violet light, as substitutes for Cod-Liver Oil, see p. 591 and Radiostol. It is held that the identity of irradiated Ergosterol with this Vitamin is established.

In high latitudes little ultra-violet light reaches the earth in winter and smoky towns prevent it filtering through.

For Rosenheim and Webster's work on irradiation of Protoplasmic Sterols, *see* Vol. II.

Occurrence.—Cod-Liver Oil +++, Cream ++, Green Vegetables ++. Similar effects are obtained by the action of sunlight on the skin.

Antirachitic Vitamin D of Cod-Liver Oil.—S. G. Willimott and F. Wokes, P.J. ii./26,473,495.

Cholesterol or Phytosterol is a parent substance of the antirachitic Vitamin D.'—L. i./26,273.

Fat-Soluble Vitamin is found in association with the Cholesterol of fats, and is increased by Ultra-Violet rays.—Prof. Dixon, B.M.J. i./25,666. *See also* our. p. 596.

Stability.—In oily media it is stable to heat and oxidation.

Ceno—Milk spring. It is possible for farmers, by ***feeding their cows on a type of yeast,*** to provide the public with milk rich in antirachitic and growth-promoting vitamins (D and B).—M. Wachtel, Munch. Med. Woch., '29,1513, per M.P., Jan. 22, '30.

Calciferol is stated to be pure crystalline Vitamin D. A white substance with M.pt. 114·5° C. Has same empirical formula as Ergosterol.

Vitamin D subcutaneously is of little or no value compared with oral use.—J. C. Drummond, L. ii./31,904.

Toxicity of Vitamin D. An agent which, in ignorance, may, and has been, used dangerously.—J. B. Duguid, L. ii./30,983.

Overdosage with Vitamin D studied by L. G. Harris, Dunn Nut. Lab. Cambridge.—M.R.C. Ann. Rept., 1929-30, B.M.J. i./31,468.

Milk ordinarily sold throughout the year contains almost ***no antirachitic vitamin,*** and a good sample of Cod Liver Oil contains from 5 to 1,000 times as much antirachitic vitamin as current samples of irradiated milk. The latter vary enormously.—K. H. Coward, L. ii./29,1090,1103.

The second most potent source of Vitamin D is **Egg Yolk,** but it varies considerably, according to the diet and the amount of Ultra-Violet light received by the hens. The eggs of irradiated hens have 10 times the antirachitic potency of those not irradiated. Eggs might well be graded on their Vitamin content, especially for hospitals and infant feeding. **Butter Fat** has relatively little antirachitic potency and in human milk it is either entirely lacking or very slight. 'Many children must grow up, and many men and women live from day to day with very little Vitamin D in their food.'—K. Blunt and R. Cowan, Jl. A.M.A. ii./29,1219-23.

Rickets is practically unknown in **Siam**—thanks to sunlight. They constantly eat lime with their betel, or areca nut. This may provide women with the necessary Calcium.—G. W. Theobald, L. i./30,1031.

Vitamin 'E.' *Oil Soluble.*

The absence of this factor from the diet of animals has been shown to cause sterility, but comparatively little is known of this Vitamin and its relation to the human economy. *Further data,* Vol. II.

Occurrence.—Wheat Germ Oil +++, Lettuce and Peas ++. Also present in yellow maize and hemp seed and in the unsaponifiable matter of some vegetable oils. Absent from Cod-Liver Oil.

Stability.—Not destroyed at 238° and not by acid nor alkali.

Iron assimilation and Vitamin E.—P.J. ii./27,210.

HABITUAL ABORTION in two patients treated. 5 Cc. by mouth daily for a fortnight in second month of pregnancy and 5 Cc. every sixth day for remaining period. Healthy children born.—P. Vogt-Möller (Denmark), L. ii./31,183.

Vitamin 'G.'

Vitamin B_2 is now designated Vitamin G. Cereals contain more Vitamin B than G: milk and meat the reverse. Wheat, maize and peas low in Vitamin G, but liver and fresh milk excellent sources.—Jl. A.M.A. ii./29,1149.

Casein may contain another Vitamin.—P.J. i./30,273.

Some References bearing on the Vitamin Theory in treatment.

Vitamin 'A' as an Anti-Infective Agent.

PUERPERAL SEPTICÆMIA treated with Vitamin A concentrates orally and subcutaneously, 5 cases made complete recoveries.—E. Mellanby and H. N. Green, B.M.J. i./29,984.

Defective Dietary.—On broad lines, we cannot forego the opportunity to point out the poor nutritive value of many of the foodstuffs which are supplied to the poorer classes—this is also fully dealt with in Vol. II.

The dietary of the people of this country is defective in two important respects (1) It contains too little of the substances containing fat-soluble Vitamins; (2) It contains relatively too much cereal. This defective dietary causes destructive action on developing bones and teeth, as the fat-soluble Vitamins ***stimulate calcification, while excess of cereal interferes with calcification.*** The widespread development of caries in children's teeth is primarily a problem of defective feeding. It is possible that the defects of diet of women during pregnancy and lactation are responsible for some, and possibly much, of the illness and mortality of young infants.—E. Mellanby, B.M.J. i./26,515-519.

Causes of our C3 population.—Widespread diseases, such as dysentery, diarrhœa, and even tuberculosis may one day be relegated to the group of deficiency diseases. Tuberculosis is always associated with fat deficiency. A lack of knowledge of elementary facts with regard to cooking of food among the women of this country is deplorable. Margarine, made from vegetable oils at high temperature, proved to produce rickets in rats.—T. E. Knowles Stansfield, B.M.J. ii./21,1021.

Vitamin underfeeding *has become a big social problem, due to our allowing eour basal articles of food to be deprived of their Vitamins. The problem can be remedied by a demand for bread containing Vitamin B, for margarine with a*

supply of Vitamin A, and by realising the importance of whole milk, and the inadequacy of skimmed milk in infant feeding.—W. Cramer, L. i./24,633-640.

Diet and Accessory Food Factors in relation to prevention of diseases of the **teeth.**—J. S. Wallace, L. ii./27,218.

The average normal ration of milk fat required by a man is 40 to 50 Gm. and the average daily consumption is far less than this amount for a large part of the population.—W. Cramer, L. ii./27,777.

Germinating legumes or cereals produce Vitamins, *e.g.*, by soaking in fresh water for 24 hours and then keeping moist for another 48 hours, when sprouts ¼ to ½ inch long will appear. If cooked in this condition for 10 to 15 minutes they are ready to eat.

Poisoning due to raw germinating beans (eaten to obtain Vitamins). Caused by **Phasin**, a poisonous hæmagglutinative substance contained in beans, peas, lentils and vetches, and destroyed by cooking. In view of the popularity of raw vegetable diets attention should be called to the danger.—Per Jl. A.M.A. ii./29,1426.

In addition to changes that occur in the eye (keratomalacia), Vitamin A deficiency has been found to give rise, experimentally, to a widespread tendency to keratinisation together with a marked loss of fat, despite abundance of fat in the diet. Connection between Vitamin deficiency and cancer ?—Jl. A.M.A. ii./25,2035.

KERATOMALACIA, produced experimentally in children in Denmark (where, curiously enough, this disease is most prevalent), showed that in spite of a varied and apparently nutritious diet an almost complete deficiency in Vitamins was established by the substitution of margarine for butter, skimmed milk for whole milk, and the absence of cream or eggs from the diet. Cod-Liver Oil effected a cure.—W. Cramer, L. i./24,633.

Beri-Beri.—*See Vol. II.*

Rickets.—In the treatment of rickets the evidence seems to be that Cod-Liver Oil should be given in conjunction with *Calcium Salts* or that irradiation should be employed to produce the ultimate same effect as the Vitamin ' D.'

The introduction of Irradiated Ergosterol (*q.v.*) and the more recent standardisation of the Vitamin D unit has placed the treatment of rickets on a scientific basis. Irradiated Ergosterol is stated to be a specific in the treatment of this and other diseases arising from a deficiency of Vitamin D.

Value of various fats as foods from antirachitic point of view. Cod liver oil, beef suet, butter and egg yolk good.—E. Mellanby, B.M.J. i./22,790.

The fact that butter fat is a feeble antirachitic is of great importance in so far as the explanation of the occurrence of rickets in the human being is concerned.—Hess and co-workers, L. ii./21,668.

The milk from cows stall-fed and kept in the dark may be of poor quality. The antirachitic Vitamin needs sunlight.—Sir W. Fletcher, L. ii./26,741.

Sunlight a more important factor than diet.—B.M.J. ii./26,606.

The antirachitic body in Cod-Liver Oil and radiant energy in the form of ***Ultra-Violet light,*** both apparently act in the same way—this mode of action is a facilitation of ***absorption of Calcium and Phosphorus from the intestine into the blood stream.***—A. Webster and L. Hill, B.M.J. i./25,957.

In **Iodine** possibly is the source of a number of ***efficient Vitamin substitutes*** offering striking parallels with the genuine article. Vitamins A and D, both of which appear to be connected with rickets, act by promoting absorption. Iodine acts similarly. ***Lack of Iodide*** means diminished size in animal experiments.—Chilean Review.

THE PRODUCTION OF THE ANTIRACHITIC FACTOR BY IRRADIATION.

Vegetable oils, dried milk, condensed milk, and wheat flour, exposed to radiations from a Mercury arc lamp, even for 2 minutes at a distance of one foot, acquire marked antirachitic properties, and may be administered in lieu of Cod-Liver Oil. These acquired

properties are maintained over long periods. Cream, hæmoglobin 'egg phosphatides,' Glycerin and Gelatin, do not acquire these properties. A cheap method for providing Vitamin-containing foods: protected by Provisional Patent.—R. C. Owens, Pres. June '26,234.

Two minutes' irradiation activates linseed oil. Irradiated olive oil can be kept 10 months: Linseed oil 6 months and still possesses antirachitic power. Severe active rickets showed bone lesions healed after two months' treatment with *irradiated sweetened condensed milk*. Dried milk cases showed healing also in 1 to 2 months.—H. M. M. Mackay and H. F. Shaw, L. i./26,8.

Irradiation of milk and the healing of rickets. The milk was exposed to the rays of a Mercury Vapour lamp of the Hanot type twice a day, in a wide shallow dish. There was a remarkable 'activating' effect, and dense calcification of wrist bone occurred.—S. J. Cowell, B.M.J. i./25,594.

Sixteen out of 18 cases of rickets recovered within four to six weeks when fed with milk previously irradiated for 30 to 60 minutes.—per Jl. A.M.A. ii./25,397.

Improvement of general condition and of focal lesions in children with active bone tuberculosis when given irradiated milk. Increase of red cells.—V. Dawkins and C. L. Pattison, L. ii./26,1315.

Value of irradiated milk in prevention and cure of rickets confirmed, *i.e.*, the cure is more quickly and economically established by irradiated milk than by various irradiated commercial preparations. May be of value also in disorders incidental to pregnancy and lactation—the climacteric, malnutrition, injuries and surgical disease of bone, and some forms of tuberculosis.—Chalmers Watson, T. Y. Finlay and J. B. King, L. ii./29,704. The therapeutic results in rickets from irradiated milk ***are not simply due to Vitamin D in it. Importance of sound clinical experience.***—Chalmers Watson, B.M.J. i./30,261.

Potency of treated milk increased nine times by exposure of 8 seconds. Can cure as well as prevent rickets.—D. Nabarro and J. O. Hickman, L. i./30,127.

Goats' Milk increased in activity even more than cows' milk.—P.J. ii./27,254.

Phytosterol $C_{26}H_{44}O + H_2O$ an alcohol contained in maize, peas, beans and the majority of vegetable oils, and **Cholesterol** obtained from oils although unable to protect against rickets can be endowed with antirachitic power by ultra-violet irradiation.—A. F. Hess and M. Weinstock, L. i./26,12.

Radiostol is prepared similarly from Ergosterol, *v.* p. 593, 594.

Irradiated Cholesterol found to prevent rickets when given subcutaneously.—Jl. Biol. Chem., per Jl. A.M.A. ii./25,224.

Irradiated Orange Juice resuscitated rachitic rats.—B.M.J.E. ii./26,26.

Scurvy.—To prevent infantile scurvy an adequate amount of Vitamin C must be present in diet. Cows' milk may be deficient in this in winter.—P. Eggleton and L. J. Harris, B.M.J. ii./25,989.

Vitamin theory of scurvy challenged.—R. Hutchinson, B.M.J. i./25,603.

Germinating Beans and Lemon Juice in treatment of scurvy in Serbian Army. Similar amounts of each given to patients in different wards. 70·4% of patients treated with Beans cured in 4 weeks, as against 52·4% of those

treated with Lemon Juice. Importance of starting antiscorbutic remedies early and avoiding destruction of Vitamin C by overcooking food.—H. W. Wiltshire, Jl. Trop. Med., Feb. 1, '23,48.

TUBERCULOSIS.—As a result of animal experiments, the late Sir P. Bassett-Smith concluded that it is good practice to reinforce the diet of early cases and to recommend Cod-Liver Oil, Marmite and fresh fruit in all cases. In slight affections, the addition of these Vitamins in man are possibly protective. —Trans. Roy. Soc. Trop. Med., Vol. 17, No. 4, p. 235.

Yeast, Irradiated. 0·75 Gm. given daily to rachitic children effects disappearance of symptoms in 6 to 8 weeks.—S. W. Kon and M. Mayzner, L. i./30,794.

The antirachitic value of.—S. K. Kon, L. ii./31,579.

VITAMIN PREPARATIONS OF COMMERCE.

The problem of preparing stable concentrates of Vitamins A and C has not yet been fully solved, at any rate in respect of foods.—Ph. Socy. Expts., B.M.J. ii./31,72.

✱**Adexolin** (T.M. 514360).

A concentrated preparation of 'A' and 'D.' Supplied in capsules. For general use in infective processes.

✱**Advita.** (T.M. 478190, 478191). A concentration of Vitamins 'A' and 'D' of potency 100 times the minimum for Cod Liver Oil U.S.

✱**Avoleum** (T.M. 520609).

Dose.—1 to 3 capsules daily.

A concentrated preparation of Vitamin 'A' for use in acute conditions where massive doses are required and Vitamin D is contraindicated.

✱**Bemax** (T.M. 481099). A cereal preparation made from germ of wheat, rye or barley. Bran is completely eliminated as makers consider it damages the intestinal wall.

Directions.—One tablespoonful daily in milk. Children, a teaspoonful. A tonic food made from the germ of cereals, such as wheat, rye or barley.

Analysis.—Protein 37·2, Fat 9, Ash 4·51 (including 2·7% P_2O_5), Fibre 1·5, Carbohydrate 41·79, moisture 6·0%.

Has high calorific value.

Stated to contain a greater proportion of Vitamins B_1, B_2 and B_3 than any other product of its kind. Also rich in 'E' and contains 'A.'

Used in rheumatoid arthritis, in which deficiency of Vitamin B in diet has been found to have adverse effect. Incidence of the disease primarily due to lack of this Vitamin. Also given in constipation, indigestion and nervous diseases.

Animals fed with Bemax and cultures of streptococci showed non-penetration of mucous membrane of abdominal cavity and only a few organisms in the lumen of the intestine, while non-Bemax animals showed the whole of the intestine loaded with organisms.

✱**Essogen** (T.M. 477726, 477727). The Vitamin 'A' and 'D' potency of this preparation is 10 times the minimum required in a Cod Liver Oil of U.S. strength, and in the case of Essogen Capsules 100 times the same strength.

Dose.—½ to 1 drachm twice a day of the liquid form. Capsules, one per day. In deficiency and wasting diseases.

✱**Metagen** (T.M. 420838) is stated to contain the three principal Vitamins, physiologically tested.

Ⓟ✱**Metatone** (T.M. 490271). A general tonic and is stated to contain in each fluid ounce Vitamin 'B' Extract 10 grains, Nucleinic Acid 2 grains, Calcium and Potassium Glycerophosphate of each 4 grains, Sodium Glycerophosphate 2 grains, Manganese Glycerophosphate ½ grain, Strychnine Glycerophosphate 8/200 grain. *Dose.*—1 to 4 drachms.

Mission Orange Juice from California contains 45% solids, 1·5% acid (as Citric), Fat and Oil 0·12%, Reducing Sugars (Invert Sugar) 5.4%, Cane Sugar (in part added) 34·16% and Vitamins. Useful in general diet, preventing scurvy, in marasmus, and as diuretic, etc.

✱**Radiostol** (T.M. 477932, 486446). *Syn.* **Irradiated Ergosterol. Viosterol** is used in U.S.A. to describe Irradiated Ergosterol.—Jl.A.M.A. ii./29,1066.

Irradiation of Ergosterol with the Mercury-Vapour Lamp produced the most powerful antirachitic substance known.

Ergosterol can also be activated by sunlight.—O. Rosenheim and T. A. Webster, L. ii./27,622.

Uses.—Vitamin D is necessary to ensure Calcium and Phosphorus absorption, *i.e.*, for the treatment of rickets. Suggested also in general spasmophilia, tetany, laryngismus stridulus (which may be associated with Vitamin D deficiency), osteomalacia, hunger osteopathy, and certain idiopathic steatorrhœas.

Feeding experiments showed that irradiated Ergosterol will protect rats from rickets in doses of less than 0·0001 mgr.—B.M.J. ii./27,888, *ibid.* 1005.

RICKETS.—Irradiated Ergosterol in doses of 2 to 5 mgr., administered either in Olive Oil or in tablet form, had curative effects in cases of rickets, late rickets and osteomalacia. In one case of osteomalacia a striking cure was obtained with daily doses of 10 mgr.—L. ii./27,766; see also *ibid.* 623.

Labour: Radiostol of benefit.—R. Kelson Ford, B.M.J. ii./30,727.

Mode of action of irradiated Ergosterol on the myelin forms of Lecithin. Vitamin D may act on bone cells in rickets concerned in calcification, and speed up their Calcium metabolism by acting on the Lipin constituents (especially the Lecithin moiety) of the cells, and by facilitating interchange through the pericellular and perinuclear membranes, enable these cells to extract the Calcium Phosphate from the blood.—C. J. Bond, L. ii./29,328.

Even minute quantities of irradiated Ergosterol fed to rabbits produced marked injury to wall of aorta and arteries of kidney.—Per Jl. A.M.A. ii./29,1428.

Toxicity of Irradiated Alcoholic Ergosterol Solutions. Toxic effects only in rats on synthetic diet—but they fail to gain weight at normal rate and show urinary calculi after prolonged use.—J. C. Hoyle, Jl. Pharm. and Exp. Therap., Mar., '30,289.

Toxic action due to (*a*) an unknown toxic substance, which causes arteriosclerosis, and (*b*) excess of Vitamin D, which produces urinary calculi and retards growth. A diet of bread and milk protects against (*a*) but not against (*b*).—*ibid.*, Nov., '30,371.

When the Vitamin content of the diet is complete and adequate, up to 1,000 times the minimal effective dose of Vitamin D, has no toxic or growth promoting effect on animals.—G. F. Cartland and co-workers, Jl. Ph. and Exp. Therap., Aug., '29,628.

Wide margin of safety of irradiated Ergosterol. Commercial preparations varied, a standard now accepted.—B.M.J. i./30,158.

Different species of animals vary markedly in resistance to excess dosage. Whereas toxic effects in rats only occur after giving several thousand times the therapeutic dose, in dogs 20 times the curative doses causes death. The human subject may share this high susceptibility with the dog and clinical evidence points that way.—B.M.J. ii./31,352.

Possibility of ill effects from—see Vol. II.

✱**Radiostol Solution** contains irradiated Ergosterol mixed with oi and adjusted to have approximately 50 times the activity of Cod Liver Oil.

Dose.—Two drops or more on sugar.

✱**Radiostol Pellets** contain this Vitamin product together with Calcium Glycerophosphate. *Dose.*—One twice or thrice daily.

✱**Radiostoleum** (T.M. 471280) is a solution of a Vitamin A Concentrate and Radiostol in a vegetable oil. Stated to have 20 times the Vitamin content of Cod Liver Oil.

✱**Radiomulsin** (T.M. 478839) is an Emulsion containing Radiostoleum.

✱**Radiomalt,** see *Malt Extract.*

Varul Ointment contains irradiated Ergosterol. Induces healing in chronic varicose ulcers.—B.M.J. ii./30,560.

✱**Viozin Ung.** (T.M. 512877).

A preparation of irradiated Ergosterol in Arachis Oil, with Zinc Oxide and Lanolin in Paraffin Base. Promotes healing of wounds and varicose ulcers.

Vitamin A (B.D.H.) is made from fresh mammalian liver. Capsules contain 3 minims each = a dessertspoonsful of Cod Liver Oil. It contains no Vitamin D. —B.M.J. i./31,757.

***Vitmar** (T.M. 389337 and 452,194, Cl. 42). *Dose.*—An eggspoonful after meals every day. Described as a food containing Vitamins A, B and C, suitable for backward and delicate children. It is stated to have a food value of 400 calories per 100 Gm.

***Vitamogen** (T.M. 363554). A food stated to be a means of supplying Vitamins readily taken which does not upset digestion for children and adults. In nervous affections, dyspepsia and malnutrition.

'University Cream,' *Syn.* EMULSIO SEVI, U.C.H. Beef suet 40 ozs., Arachis Oil 5 ozs., Syrup 25 ounces, Benzoic Acid 40 grains, Decoction of Irish Moss 70 ozs., water to 1 gallon. Melt the suet, add the oil and the Benzoic Acid. Heat the Moss Decoction to about 60° C., place in an emulsifier and add the fats at about the same temperature. Finally add the syrup and water. This keeps well and mixes well with milk.—C. H. Hampshire and G. E. G. Hawker, B.P.Conf., 1919.

For use instead of cow's cream in preparing infants' feeds.

It supersedes '**Marylebone Cream.**'—Eric Pritchard, L. i./20,607.

Butol Emulsion V.H.C. (***Butol** is T.M. 416621).

An emulsion of fats and oils (Beef Dripping, Cod Liver Oil, Arachis Oil and Butter) with Glucose and 5% Cane Sugar—with or without Dextrin, using Irish Moss to suspend. For feeding of children.

'**New Zealand Cream**' as manufactured in New Zealand's Government Factory and intended for use throughout that country contains 50% fat, of which 2/3 is animal oil, including fresh New Zealand butter and Cod-Liver Oil, and 1/3 vegetable oils, mainly pea-nut; sugars, mainly Dextrose and a little Lactose, made up 40%. Satisfactory in use, readily assimilable, sterile, containing Vitamins intact, and high caloric value of 180 per ounce.—R. Jewesbury, B.M.J. i./26,245.

A useful DIET SCALE. Equivalents of foods (Carbohydrates, proteins and fats). An ounce of Carbohydrates or protein yields 120 calories, and an ounce of fat yields 270 calories.—H. S. Pemberton, B.M.J. i./23,680.

P1 NUX VOMICA.

P1 *and all preparations or admixtures containing* 0·2% *or more of Strychnine.*

Antidotes. *See* **Strychnine.**

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in powder. FR. CX. (*vide infra*) approximates latter as a maximum dose during 24 hours.

The dried ripe seeds of *Strychnos Nux-vomica* (*Loganiaceæ*), imported from India and Ceylon, contain from 0·7 to 1·5% of Strychnine. *B.P.* '14 requires the drug in powder adjusted to 1·25% Strychnine.

F.I. (Second) recommended a standard of 2·5% total alkaloids. This is in accord with nearly all the pharmacopœias, including recently issued F.E. VIII., P. Belg. IV., and P. Ital. V. The British delegates pointed out that a standard based on Strychnine content is best.—E. White, P.J. i./26,294.

A minute quantity of copper is said to be present in the seeds, and this may colour mixtures made with Tinctures of Nux Vomica and Sal Volatile a bluish green shade. FR. CX. requires not less than 2, nor more than 3% (combined) alkaloids.

For further details on Assay of Nux Vomica, see Vol. II.

Flavoring for Nux Vomica preparations, see Strychnine.

Uses.—A bitter stomachic and tonic. Stimulates the bowels; hence added to aperients. Increases nervous energy. Given to relieve shock and collapse from anæsthetics. Is employed in dyspepsia, heart weakness, and as a general tonic in all conditions of debility and neurasthenia. For the aged, this and Strychnine have been described as the only suitable bitter tonics.

In phosphaturia, small doses of Nux Vomica and of Diluted Hydrochloric Acid are often of great service.—Tirard, Med. Treatment.

℗ **Extractum Nucis Vomicæ ('Siccum')** (*B.P.* '14).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

Contains 5% of Strychnine, adjusted with Calcium Phosphate.

This Extract absorbs moisture: Quantitative data.—F. Wokes, P.J. ii./26,188.

Fr. Cx. conforms with F.I. (Second) making the preparation 16% total alkaloids, with *max. single dose* $\frac{5}{8}$ grain and max. in 24 hours $1\frac{1}{2}$ grains approx. U.S. X. practically agrees with F.I. (Second). Nux Vomica Extract elsewhere abroad is called **Extractum Strychni.** P.G. VI, P. Ital. V., F.E. VIII. and P. Belg. IV. also agree with F.I. (Second).

℗ **Extractum Nucis Vomicæ Liquidum** (*B.P.* '14).

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Prepared by re-percolating the seeds in powder with Alcohol 70% (60% is adequate and it leaves the fat behind), defatting with Hard Paraffin, and adjusting the strength so that the extract contains 1·5% of Strychnine. P. Ital. V. has 2·5% Alkaloids.

Ⓟ **Tinctura Nucis Vomicæ** (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often less.

This contains 0·125% of strychnine, and is made on the lines of *B.P.* '98. One ounce contains about $\frac{1}{2}$ grain of strychnine, or about half the quantity in the Tincture of *B.P.* '98, and the same strength as *B.P.* '85. It now = approx. F.I.

F.I. (Second) recommended 0·25% total Alkaloids = P. Belg. IV., F.E. VIII. and P. Ital. V.

Fr. Cx. prepares by dissolving 1·562 Gm. Extract (Fr. Cx.) in Alcohol 70% *q.s.* to produce 100 Gm. This contains 0·25% combined alkaloids (F.I.). Max. single *dose*, 19 minims. Max. during 24 hours 95 minims approximately, U.S. X. is a 1 in 10 Tincture adjusted to 0·25% Alkaloids (Total).

℗ **Tablets** equal 5 and 10 minims of the tincture.

Ⓟ **Tinctura Ignatiæ.**

Dose.—3 to 20 minims (**0·2 to 1·2 Cc.**).

From St. Ignatius' Beans, the seeds of *Strychnos Ignatii* (*Loganiaceæ*) (containing about $1\frac{1}{2}$% Strychnine and 1% Brucine) 1 part, and a mixture of 90% Alcohol 3 and Water 1, *q.s.* to produce 10 parts. A preparation known as ℗ **Gouttes Amères de Baumé** (Fr. Cx.), is of strength 1 in 5. *Max. single dose* 4 minims. Max. during 24 hours, 30 minims approximately.

The Beans termed **Fève de Saint-Ignace** in Fr. Cx. from which this Tincture with the above Synonym is prepared, contain about 2·5% combined alkaloids. *Max. single dose* of the powdered Beans $1\frac{1}{2}$ grains, *Max.* during 24 hours 5 grains approx.

℗ **Cabalonga de Tabasco, Ph. Mex. V.**—Mata-perros, veneno del diablo. *Strychnos triplinervia*, Mart. According to Professor Graham, the seeds contain 1·83% of strychnine and brucine. Used in place of St. Ignatius' Beans.

OLEA ESSENTIALIA.

The various essential oils used in medicine, prepared either by distillation or expression or a combination of the two, are dealt with under their respective headings.

For processes of Assay of Essential oils, see Vol. II.

Constitution of Essential Oils.—J. E. Driver and G. E. Trease, P.J. ii./27,164.

Antiseptic powers of certain Essential Oils.

The Carbolic Coefficients obtained by us under certain conditions (*vide Vol. II.*), for Essential Oils, show that several possess considerable antiseptic power. For example, Origanum Oil (containing over 80% Phenols, *e.g.*, Carvacrol), had almost the same coefficient as Thymol—an acknowledged excellent antiseptic, viz., 25 to 26. Following these came Oil of Thyme containing less Phenols, then Geraniol, Cinnamon Oils, Clove Oil, and so on in this order.

As an outcome of our investigations Saponaceous Solutions of some of the Essential Oils are prepared for physicians' use under the name–

Perfumed Formosyls of Almond, Cassia, Cinnamon, Citronella, Eucalyptus (Amygdalina), Eucalyptus (Globulus), Geranium, Lavender, Lemon, Origanum, Otto of Roses, Rosemary, Thyme and Wintergreen.

Uses.—For disinfection of the hands and skin. A tablespoonful to be poured in the palm of the hand and well rubbed and lathered with an equal quantity of water for two minutes. For treatment of skin affections local use as paints or lotions is suggested. The strength of Perfumed Formosyls is so arranged that when using any of them as directed, the quantity contains sufficient Essential Oil to act as a bactericide in the light of knowledge which we have obtained comparatively with Carbolic Acid.

Terpeneless and Sesquiterpeneless Essential Oils are described in *Vol. II.*

OLEATA.

Acidum Oleicum. U.S. P. Jap.

$CH_3(CH_2)_7CH:CH(CH_2)_7COOH = 282{\cdot}2652$.

A pale-sherry coloured faintly acid oily liquid (at ordinary temperatures) with a slight odour. ***Solubility,*** readily in 90% alcohol, ether, chloroform, benzol, and fixed oils; insoluble in water; it dissolves most metallic oxides, thus forming indefinite oleic solutions of oleates in an excess of Oleic Acid; such combinations of bismuth, copper, lead, mercury, and zinc are used medicinally; they are soluble in fats. Oleic Acid also dissolves alkaloids, but not their salts, *e.g.*, Oleate of Aconitine, Oleate of Atropine (2½% perfumed with Otto), Oleate of Morphine and Oleate of Veratrine are used medicinally. Oleic Acid is much more readily absorbed by the skin than oils.

Conversion of Unsaturated Fatty Acids into Saturated, *e.g.*, Oleic into Stearic Acid—$C_{18}H_{34}O_2 + H_2 = C_{18}H_{36}O_2$. This achievement—a matter of great importance in the Oil industry—has been effected by bringing the Hydrogen and the liquid fat together at high temperatures in the presence of finely divided Nickel (or Cobalt, Platinum, etc.) as catalytic agent. The products are used both for food and for soap making.

Pharmacology.—Subcutaneous injections of Oleic Acid Soaps caus. anæmia.—A. E. Boycott, B.M.J. ii./10,1420.

Sodium Oleate, *inter alia*, increases the action of **lipase** *in vivo* and *in vitro* —J. A. Shaw Mackenzie. See further under Sodii Oleas.

To prepare pure Metallic Oleates.—Caspari recommends the preparation of (*a*) Sodium Oleate and (*b*) Potassium Oleate Solutions in place of ordinary Soap solutions. (*a*) Warm 1,217 grains Oleic Acid to 60° C. and add slowly 192 grains Sodium Hydroxide (90%) dissolved in a mixture of 2 ounces Distilled Water and 6 drachms of Alcohol, stirring constantly until acid neutralised (use Phenolphthalein Solution). Dissolve finally in 3 pints of water and filter. (*b*) Neutralise 410 grains Potassium Bicarbonate with 1,156 grains Oleic Acid in 1 pint of water by boiling. When cold make up to 3 pints. To the Solution (*a*) add Lead Acetate crystallised 819 grains, Copper Sulphate 540 grains, Zinc Sulphate 621 grains, Mercuric Nitrate 711 grains, or to (*b*) Lead Acetate crystallised 777 grains, Copper Sulphate 510 grains, Zinc Sulphate 591 grains, or Mercuric Nitrate 675 grains, each dissolved in 1½ pints of water to produce the corresponding pure Oleates.

Capsules of Oleic Acid, 7½ minims. *Dose.*—One or two daily.

These are given for hepatic colic, and to hinder the formation of gall stones. Best taken in the morning on an empty stomach.

℞ ℙ **Oleanodyne.**

A special preparation combining the alkaloids aconitine, atropine, morphine (0·3%), and veratrine, with oleic acid. It is rapidly absorbed, and forms a strong anodyne liniment, which can be diluted with chloroform, alcohol, or oils.

Cupri Oleas, Copper Oleate.

$(C_{17}H_{33}COO)_2Cu = 626·0848$. (Theoretical formula for Pure Oleate)

Add a hot solution of copper sulphate 3 in 8 of water to a hot solution of Castile Soap 8 in 32 and wash and dry the precipitate. When cold it is in solid dark-green masses. It is an oleo-palmitate of copper, containing copper equivalent to about 10% Cupric Oxide. Soluble in ether.

Injections of 1 Cc. 1% suspension on 3 consecutive days in guinea-pigs well tolerated. Suggested for use in bronchiectasis, fœtid bronchitis, and ulcerative pulmonary tuberculosis.—R. B. Billimoria, Dec., 1931.

Unguentum Cupri Oleatis.

Copper Oleate 12, Yellow Soft Paraffin 88. Melt together. For some purposes it may be employed half strength.

Ringworm is well treated with it—lightly rubbed in night and morning, also for indolent ulcers, warts and corns, and has been used to remove freckles.

Copper Oleate ointment, combined with Cuprase injections, used with success in phagedena, and in sycosis, with Ammoniated Mercury locally.—R. B. Billimoria, Dec., 1931.

Bougies of Copper Oleate are prepared 4 inches long containing each 5 grains (0·3 Gm.) Copper Oleate with Theobroma basis.

Ovules of Copper Oleate, with Cacao Butter contain 5 grains.

℗ **Emplastrum Cupri Oleatis** contains 20% of Copper Oleate made with Soap Plaster spread on Adhesive Plaster.

For the treatment of malignant disease. These were advocated as adjuvants to Sodium Coumarate treatment by the late L. Drage.

Hydrargyri Oleas. Mercuric Oleate (*B.P.* '14). 20% Oxide.

By acting on Mercuric Oxide with Oleic Acid using slight warmth (B.P., '85 was 10%).

Unguentum Hydrargyri Oleatis (*B.P.* 14).

Mercuric Oleate 1, Benzoated Lard 3.

'Capsungs' of this ointment are prepared containing ½ drachm in each for inunction.

℞ ℙ1 **Oleatum Hydrargyri** (10%) **cum Morphina.**

Morphine (base) 1, is dissolved in 60 of the 10% Oleate. Linimentum Hydrargyri Oleatis cum Morphina, R.O.H., is similar. For use where the plain Oleate causes pain.

Uses.—For syphilis in secondary and tertiary stages, excessive use to be avoided. In persistent inflammation, especially of glands, and joints (such as synovitis), and in non-ulcerated syphiloderma, these Oleates are more active and cleanly than mercurial ointment. They are very effective parasiticides for pediculi and ringworm.

In rheumatoid arthritis the joints thickened by fibrous adhesions and fibroid thickenings of the synovial and periarticular tissues are treated with Mercuric Oleate.

Oleatum Hydrargyri cum Sulphure.

Mercuric Oleate 5%, 4, Precipitated Sulphur 1, Ether 3.

For pediculi pubis.

Unguentum Hydrargyri Oleatis Compositum. — Brooke's Ointment.—Mercuric Oleate Ointment (5%), Compound Zinc Paste (Lassar's Paste) of each 41, Salicylic Acid 6, Ichthyol 12.

In (septic) œdema of the face has been applied covered with cotton wool in thick layer and pressed down by cotton elastic bandage.

Syphilitic Disease of the Nervous System. A drachm of the 10% oleate as advised by Gowers, to be rubbed in near the affected part twice daily for three or four days, and then once daily for remainder of the week; near the scalp if in the brain, and down the back if in the spinal cord: treatment to be brief, to last eight weeks or so, and to be renewed after two, four or six months.

Ⓟ **Emplastrum Hydrargyri Stearatis.**

Lead Plaster 6, melt and add **Mercuric Stearate** [$(C_{17}H_{35}COO)_2Hg$=767·156] 2, made by direct combination of Mercuric Oxide 10, with Stearic Acid 26 or *q.s.*—Melt the acid and gradually stir in the oxide until all dissolved—a sand bath may be necessary. Is a substitute for mercurial plaster. It is pharmaceutically inelegant.

ℙ1 **Emplastrum Plumbi** (*B.P.* '14). *Syn.* Diachylon Plaster.

ℙ1 *Lead in combination with Oleic Acid or other higher fatty acids, whether sold as Diachylon or under any other designation (except Machine-spread Plasters)—May* 27/17. *We have followed the letter of the law by placing* '**Preparations of**' *in* Ⓟ. *Obviously in doubtful cases they should be treated as* ℙ1.

Lead Plaster is a crude Oleate of Lead, made by the combination of olive oil (oleate and palmitate of glyceryl) and oxide of lead heated together in the presence of water. Thus made, the oleate is more adhesive than when prepared by the oleic acid solution of the oxide.

This has been used as an abortifacient in the Midland Counties.

Diachylon Pill poisoning (taken to produce abortion). *Treatment.*—Sodium Monosulphite 1/3 grain with Tincture of Cardamoms thrice daily.—B.M.J. i./13,1199. Poisoning Recovery. A powerful and dangerous ecbolic.—B.M.J. i./06,259. by: Treatment by potassium iodide, opium and bismuth.—B.M.J. i./06,259.

Ⓟ **Emplastrum Resinæ, Adhesive Plaster** (*B.P.* '14).

Is more adhesive than Lead Plaster. Ⓟ **Emplastrum Saponis** is similar, but less adherent than the latter.

Ⓟ **Emplastrum Adhesivum.**

U.S.X. A mixture of rubber, resins and waxes with a filler of absorben powder, *e.g.*, zinc oxide, orris root or starch mechanically mixed. The mas should contain about 30% of rubber. When Zinc Oxide is used it should b at least 20% of the plaster mass. *Contains no lead.*

Adhesive Plaster. Taffetà Adesivo, P. Ital. V.

Dissolve Fish Glue in small pieces 100 Gm. in warm water 2,000 Cc., and add Alcohol 95% 81½ Cc. and Honey 10 Gm. Keep warm on a w.b. and apply 4 or 5 layers to fine silk tissue (allowing each layer to dry separately). Then apply Balsam of Peru 1 Gm. mixed with Tincture of Benzoin 4 Gm., and a final coating of glue. Dry, and keep away from air and light.

The following ointments are prescribed for eczema, excessive perspiration of the feet, etc.

Ⓟ **Unguentum Diachyli.**

Lead plaster 1, Yellow Soft Paraffin 1.

Melt together and stir till cold. Made thus, the ointment keeps well, and does not acquire a disagreeable odour.

Ⓟ **Unguentum Diachyli Carbolisatum** (*Lassar*) is the same with 2% of phenol.

To be rubbed in 1 to 3 times a day, or spread on linen and applied as a plaster. **U.S.** has Lead Plaster 50, White Petrolatum 49, Lavender Oil 1.

Thorii Oleas *v.* Thorium Compounds.

Unguentum Zinci Oleatis (*B.P.* '14).

Precipitated Zinc Oleate 1, White Soft Paraffin 1. Melt together and stir till cold. For some cases further dilution with Soft Paraffin is advisable. This ointment will cure chronic eczema.

Zinci Oleas—*Syn.* Zinc Oleo-Stearate. (*B.P.* '14).

$(C_{17}H_{33}COO)_2Zn = 627{\cdot}8948$. Theoretical formula for the Oleate.

Manufacture—To a solution of Hard Soap 2, and Curd Soap 1 in Water 15, add Zinc Sulphate 1 in Water 2.

This makes a *harder* preparation than the following :—Hard Soap in shavings 16, Boiling Water 120 ; heat to dissolve. Zinc Sulphate 8, Boiling Water 16 ; dissolve and add to former solution ; stir well, separate the water from the Oleate, and wash the latter with hot water till free from sulphate, cool, and dry.

Reduced to powder is useful for dusting on eczematous surfaces and for excessive perspiration. It may be perfumed by the addition of $\frac{1}{500}$ of thymol, and diluted with kaolin or starch.

Ⓟ **Unguentum Oleatorum, G.H.**

Zinc Oleate Ointment, Diachylon Ointment and Mercury Oleate Ointment of each equal parts.

Zinci Stearas, U.S.X.

A white powder, yielding 13 to 15·5% of Zinc Oxide. Contains a small proportion of palmitate. Manufactured by precipitating a Curd Soap solution with Zinc Sulphate.

Poisoning due to accidental inhalation of Zinc Stearate, *see Edn. XIX, p.* 604.

Bismuthi Oleas. $Bi_2O.(C_{18}H_{33}O_2)_4 = 1559{\cdot}0296$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) but larger amounts would be used in X-ray work.

Manufacture.—Dissolve Bismuth Nitrate (cryst.) 960 grains in Glycerin, 40 ounces by weight in the cold. Add to the solution

3 pints of the Sodium Oleate solution (p. 598), wash by decanting, collect and dry. A greyish white unctuous substance.

Uses.—Should prove useful in place of Subnitrate or Carbonate in X-ray diagnosis : It would not be attacked so readily by the stomach juices. Might be tried instead of other Bismuth compounds, *e.g.*, to form a coating on the stomach or intestines in gastric ulcer.

Stanni Oleas. $Sn(C_{18}H_{33}O_2)_4$ (?) = 1243·7296.

Dose.—Not used internally.

Manufacture.—Add Stannic Chloride, 566 grains dissolved in a little water to 3 pints of the soap solution (*v.* p. 598).

Uses.—Has been employed in diseases of the nails—overcomes brittleness, splitting, etc.—Squire.

Uranii Oleas. $UO_2(C_{18}H_{33}O_2)_2$ = 832·6848.

Dose (suggested).—$\frac{1}{2}$ to 5 grains (**0·03 to 0·3 Gm.**).

Manufacture.—Employ Uranium Nitrate 1,092 grains with 3 pints of the Sodium Oleate solution, p. 598.

A yellow substance of plastic consistence.

Uses.—Possesses radio-active properties. Suitable for local use to malignant growths and in skin affections as **Unguentum Uranii Oleatis.**—25% strength in Unguentum Lanolini softened if necessary *cf.* **Unguentum Thorii Oleatis.**

Silver Oleate, Iron Oleate (*Dose.*—5 to 15 grains) and the Oleates of **Strontium, Barium, Calcium** and **Magnesium** have also been prepared. For details of manufacture and properties, see Edition xviii., pp. 605 and 606.

Silver Oleate Injections, 1 to 2 Cc. hypodermically of a 1% suspension gave good results in gonorrhœal arthritis, but very painful. Suggested in influenzal pneumonia.—R. B. Billimoria, Dec., 1931. Well tolerated in enteric and septic conditions—R.B.B., 17.6.32.

OLEUM CHAULMOOGRÆ, incorrectly termed Oleum Gynocardiæ (*B.P.* '14 Synonym); U.S.X., P. Argent. II., Ph. Ned. V., P. Belg. IV., F.E. VIII., *together with notes on* 'Oleum Hydnocarpi.'

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), increased to 1 drachm (**4 Cc.**) in capsules, cod-liver oil, or milk. F.E. max. single 1 Gm., *p. die.* 5 Gm.

The oil (about 33%) expressed from the seeds of *Taraktogenos Kurzii-King.* This is an evergreen shrub growing in Chittagong, Burma, and other parts.

The fruits yielding genuine Chaulmoogra Oil are distinguished from those of Gynocardia by containing *many* seeds (average 21) packed close together and facetted by mutual pressure, hence no two are the same identical shape, and having no pulp, the embryo is vertical and cordate, while that of Gynocardia is lateral and reniform.

The oil from *Taraktogenos Kurzii* is cold-drawn. It is a yellow oil with an odour of rancid butter and M. pt. of 22—23° C. The residual cake is valuable for cattle feeding.

The Kalaw Tree frequently stated to be the historic origin of Chaulmoogr Oil is apparently the Burmese name for Taraktogenos Kurzii.—J. C. Ghos L. i./23,630.

Latterly the oil of various species of Hydnocarpus, *e.g.*, **Hydnocarpus Wightiana** or **Asteriastigma Macrocarpa**, growing in Sout and West India have attracted much attention (see p. 606) althoug relatively recently these were regarded as spurious substitute They differ in colour, odour and specific gravity.

Oleum Hydnocarpæ P. Jap. IV. is obtained from the peeled seeds Hydnocarpus. At 22 to 23° C. the oil almost completely liquefies and 25 to 30° C. it melts completely.

The name Chaulmoogra has been sometimes misapplied to a smaller see derived from **Hydnocarpus anthelmintica**, a native of Siam, where it known as Lukrabao. This is exported to China and used there for lepros in place of the true Chaulmoogra, which may be regarded as the East India remedy. The oil of **Hydnocarpus Wightiana** *Blume* (*P. off.*), is used in Wester India, and it has been found that all these oils, as well as that of *Onchot echinata* Oliv., a native of Sierra Leone, contain Chaulmoogric Acid.

Oil from *H. anthelmintica* seeds grown in Ceylon contains glycerides of bot Chaulmoogric and Hydnocarpic Acids and should be suitable for use in leprosy —Imp. Inst. Rept., 1929. This and *H. Wightiana* have been growing in t British Possessions since 1925.—Sir L. Rogers, B.M.J. i./31,73 ; see also A. W Hill, L. ii./30,764, for other varieties.

Against acid-fast bacilli *H. Wightiana* is a powerful antiseptic.—Sir L Rogers.

Gynocardia Odorata Oil has a brown colour and odour resemblin painter's varnish and remains liquid at ordinary temperature down to 4·5° C It is stated to have no therapeutic value in leprosy.—E. E. Francis, Chi Medical Officer, Assam Bengal Ry., Chittagong. It does not contain Chau moogric Acid but consists chiefly of the Glyceryl esters of Linolic and Linolin Acids.

U.S. X. states the oil from certain sp. of Hydnocarpus—when designate as such and agreeing in physical and chemical characters with Chaulmoogr Oil *may replace*.

Uses.—The oil is applied externally, and given internally *after meals*, for leprosy, phthisis, scrofula, rheumatism, marasmus, psoriasis and lupus. The treatment of leprosy with it has to be persisted i for several years. The theory of its action in leprosy seems to b that it increases the number of leucocytes and enhances the bacteri cidal properties of the blood. Leprosy has also been treated by half ounce doses per rectum daily. Patients must refrain from salte food such as fish, cheese and vegetables.

For phthisis 2 to 4 ounces should be rubbed into the chest weekly Applied to raw surfaces, however, causes great pain.

In the knowledge of the writer, a patient suffering from leprosy took over long period, a large quantity of Chaulmoogra Oil Capsules. The dosag employed was two 15 minim Capsules four times daily, increased. He foun that he could take up to 200 minims per diem, but larger quantities had tendency to make him sick. The spots on the face and hands disappeare almost entirely, but there remained the deadened feeling of the tissues o which there was hope of complete disappearance.

Emulsio Olei Chaulmoograe.

Dose.—½ to 1 drachm (**2 to 4 Gm.**).

We found the following formula satisfactory to produce a liqui Chaulmoogra preparation :—

Chaulmoogra Oil 1 ounce, Poppy Seed Oil 2 ounces, Powdere Gum Acacia ¾ ounce, Cinnamon Oil 6 minims, Saccharin Elixi 45 minims, with Water to make 6 ounces.

Injectio Olei Chaulmoograe Intramuscularis.—*Martindale.*

Dose.—½ to 1 Cc., increased to tolerance.

Chaulmoogra Oil and Almond Oil equal parts, sterilised.

This and other formulæ, *e.g.*, Heiser's Injection (see Edn. XIX, p. 606), have been given by intramuscularly, but McCoy and Hollman, Public Health Bull., 75, January, 1916, Washington (L. i./16,790), found the injection of oily preparations of Chaulmoogra badly tolerated—causing abscess, heart failure, etc.—in cases treated at the Hawaii Settlement. (Sodium Chaulmoograte 'C' on the other hand is tolerated.)

The following is said to be *painless.* Chaulmoogra Oil 90, Olive Oil 10, Benzocaine 3. 5 Cc. injected at body temperature in deltoid region, alternating semi-weekly with 8 Cc. in buttocks.—U.S. Public Health Service, L. i./28,101.

The Oil has also been given *intravenously* and *per rectum*, see Edn. XIX, p. 606.

See also treatment with Hydnocarpus Oil preparations, p. 606, *and with a Vaccine, p.* 609, *Leprosy Bacillus, Vol. II*, and *Leprosy, a self-healing disease, p.* 608.

The leucocytosis produced by Chaulmoogra Oil is a means of transport whereby the drug is brought into direct contact with the bacilli in the lymph circulation.—China Med. Jl., per Jl. A.M.A. ii./25,931.

Capsules of Chaulmoogra Oil contain 5, 10 and 20 grains.

Unguentum Chaulmoograe (*B.P.*'14) *Syn.* UNGUENTUM GYNOCARDIÆ, 10% in Paraffin basis.

Sodii Chaulmoogras, Pure Commercial, from genuine *Taraktogenos Kurzii* Oil.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily or to limit of toleration. Sufficient should be given to saturate the system and over a long period. *cf.* paper by E. Muir, p. 608.

Manufacture.—Saponify genuine *Taraktogenos* oil by boiling with a sufficiency of strong soda lye and throw out the acid with hydrochloric acid. Wash with warm water until the wash liquor is free from acid and convert into the sodium salt.—W. H. M. See also H. C. T. Gardner, P.J. ii./22,154 and note by W. H. M. *Ibid.* 207.

Fractionation of Chaulmoogric Acid into portions.

We originated in 1915 the idea of fractionating the Chaulmoogra acids and introduced them as sodium salts for use. *Originally there were four fractions 'A,' 'B,' 'C' and 'D.' It was decided to group 'A' and 'B' as also 'C' and 'D.' There remain therefore 'A' and 'C' as described below.* We had pharmacological researches made with them before their use in man.

Sodium Chaulmoograte "A" *Martindale* comprises the salts of the higher acids with relatively high melting points. This compound salt contains the true Chaulmoograte and Palmitate and homologues, the acids of which have combined melting point of 50° C. approximately. It represents 50–75% of the total.

Sodium Chaulmoograte "C" *Martindale* (*free from Palmitate*), comprising the lower acids with relatively low melting points. It contains the lower homologues with combined melting point of 25° C. approximately.

Whilst the "A" salt is not soluble in a proportion to permit of the ready administration of 3 *or* 4 *grain doses, it can be given in pill form. Simultaneously the "C" chaulmoograte, which is readily soluble, is*

used hypodermically. In this way the total active constituents commercial Chaulmoogric Acid are utilised.

So far as we are aware no pharmacologist has been able to poi to the real therapeutically active constituents of Chaulmoogra C and it is possible that a fractionation on these lines may enable us t separate the useful from the inert components. (*cf.* Theory Action, p. 602).

Sodium Chaulmoograte "A" Pills and Gelatin Capsule 1, 2 and 3 grains (**0·06, 0·12, and 0·2 Gm.**) are prepared.

Dose.—One thrice daily after meals or *ad lib.*

Sodium Chaulmoograte "A" Suppositories, 1, 3 and 5 grai (**0·06, 0·2 and 0·3 Gm.**) or more are also made.

Sodium Chaulmoograte "C" Hypodermic Sterules, 1, 2 an 3 grains (**0·06, 0·12 and 0·2 Gm.**).

Dose.—An injection may be given deeply *under* the fat layers— this is stated to reduce reaction—once or twice a week or as found t be tolerated. *Note.*—Warm the Sterule slightly if necessary.

We have had *no* adverse reports on the injection of Sodium Chau moograte "C," *cf.* Physiological Expts. *infra.*

The Superintendent of a Leper Asylum informs us privately tha the Injection 'C' is much less painful in use than the Chaulmoogr Oil and Camphor Mixture.

Physiological Experiments with our Fractions.

From the work specially done for us (1915) with rabbits and cats (for de tails see Edn. XVIII, p. 609, 610), it became clear that weight for weight— comparing the results on animals with the dosage for man—three grains o our *"C" Fraction* ought *certainly to be tolerated even* ***in 20% solution intravenously,*** but the subcutaneous method would seem preferable.

This point was of great importance in view of the need to virtually saturat the system with the drug. Since that time most extensive use of these "C" injections has been made clinically.

Sulphuric Acid Test on "A" and "C" Fractions.

Both 'A' and 'C' Acid fractions give the recognised green colour wit Sulphuric Acid common to Chaulmoogra Oil. It is preferable to have the fat in *excess* of the Sulphuric Acid. The 'A' responds with stirring in a minut or two. The 'C' gives it in almost the same time, but is not so marked.

References.

Numerous accounts of the Sodium and Potassium Chaulmoograte, including the work of Sir L. Rogers on similar lines to our own have appeared.

Chaulmoogric Acid and Hydnocarpic Acids were found the acids specifi against acid-fast bacilli, see Edn. XIX, p. 608.

Good results in long-standing infection from the use of Sodium Chaulmoo grate (*Martindale*) in sufficient quantity to saturate the system to the limi of toleration, treatment extending over months. Eye affection improved nodules diminished, bacilli disappeared from nasal mucus and anæsthetic condition of the skin improved. Intravenously 0·04 Gm. given every second day followed by an interval of 25 days after each twelve injections. In some cases a 1% or 1·5% solution was better tolerated than the 3% solution. Found to be one of the best anti-leprosy remedies, intense and rapid in action.—E. Balbi, Giornale Italiano di Dermat., e Sifilog. Fascicolo II, 1926, B.M.J.E. i./27.

A number of old-standing cases were treated in 1927 by S. M. Allievo at the ***Dermosyphilitic Clinic*** of the ***University of Cagliari*** with Sodium Chaulmoograte supplied by the author with good results. Lesions and nodules in many cases disappeared and there was marked improvement in the condition of the patient and increase in weight. Most of the cases had received previous treatments with various medicaments, some of them lasting over considerable periods of time and involving hundreds of injections, without appreciable amelioration.

The injections of Sodium Chaulmoograte were given either intravenously or intramuscularly, and in some cases the course of intravenous injections was followed by an additional course of intramuscular, injections being given thrice weekly. The following is a typical course of treatment:

Treatment with Sodium Chaulmoograte was started following a month's rest from a previous course of Antileprol. In all, 40 intravenous injections were given and 50 intramuscular, in three courses, with 20 days' interval between each course, the treatment being combined with Hypophosphites by the mouth. Treatment lasted about 9 months, during which time the patient was given 6·58 Gm. Chaulmoograte intravenously and 8·88 Gm. intramuscularly. The first course of 40 injections was spread over 3 months, the second of 10 injections over 1 month and the third of 40 injections over 3 months. The injections were well tolerated.

A further Report from Cagliari University states:

"Sodium Chaulmoograte, used with caution, has proved to be tolerated, either intravenously or intramuscularly over a long period of time, and, in association with local treatment, good food, fresh air, etc., is an anti-leprosy preparation in no way inferior to Antileprol or Collobiase, and, moreover, ***when used intravenously, it has an undoubted beneficient action*** which is more rapid and intense than that of the Chaulmoogra Oil, though perhaps not so lasting." **Collobiase.**—An emulsion of the formula: Chaulmoogra Oil 0·36 Cc., Gum Acacia 5 Gm., Distilled Water 500 Cc. *Hypodermically* commence with 1 Cc., increased by 0·1 Cc. on alternate days, up to a total of 5 Cc., which dose is maintained up to the 20th injection. *Intravenously* commence with 0·25 Cc., increased by 0·1 Cc. on alternate days up to 2 Cc., which dose is maintained up to the 20th injection. —Antonio Marras, 'La Terapia della Lepra ed i Risultati Ottenuti coi Moderni Trattamenti,' University of Cagliari, 1929, p. 133.

*** Collobiases** is T.M. 401085.

Vaccines *are also advised by the University*, *see p.* 609.

Sodium Chaulmoograte in leprosy.—Best results by weekly intradermal infiltration (10—20 sq. inches of skin at a time). Hydnocarpus Oil itself is not suitable—esters preferable. Progressive improvement from infiltration once a fortnight or even monthly. To raise patient's resistance give 0·02 Gm. Potassium Antimony Tartrate every second day intravenously with large doses of Calcium and alkalis *per os*. Pain relieved by Adrenalin intramuscularly or Ephedrine orally or by infiltration.—E. Muir, L. i./31,1401.

TUBERCULOSIS.—A girl aged 15, with a sputum loaded with tubercle bacilli, had the injections and went through a full training as a nurse and died of a recrudescence of the disease 5 years after the injections. The evidence therefore was that the Sodium Chaulmoograte did good.—C. Milne, May 5, 1927.

Unna's Chaulmoograte Pill.

Contained Sodium Chaulmoograte, Ginger and an aperient.

Magnesii Chaulmoogras. Phineas Abraham employed this compound in leprosy.—B.M.J. ii./92,1111,1198.

Ethyl Chaulmoograte. U.S.X., F.E. VIII. *Syn.* CHAULMARTIN, *MOOGROL (T.M. 410850).

Dose.—1 Cc. intramuscularly increased by 1 Cc. at every second or third injection until from 2 to 6 Cc. is reached. Initially it is suggested to mix with equal quantity of Olive Oil. Injections are made deeply in the upper and outer quadrant of the gluteal region.

Intravenously, if the above is not tolerated, ½ Cc. increased to 1 Cc. usually once a week.

Manufacture.

Saponify the oil and precipitate the acids. Dissolve these in an equal weight of ethyl alcohol and pass in gaseous hydrochloric acid while heating under a reflux for 1 hour. Cool, pour into water and wash with sodium carbonate solution. Dissolve the oil in ether and dry with anhydrous sodium carbonate. Filter, and evaporate the ether.

To obtain colourless it may be necessary to distil *in vacuo*.

Characters.—A mobile liquid, almost colourless, with very slig chaulmoogra odour. Sp. Gr. 0·910 to 0·917 (U.S. X. 0·904). Slightly ac (5 Cc. require not more than 0·2 Cc. N/10 NaOH). Saponification val 195 to 200 (I.V. 90—100). M.pt. of mixed acids on saponification 40 to 45° —these data are according to our own experiments, 1923.

Uses.—It has been claimed that a preparation of this descriptio would be superior for subcutaneous use. H. T. Holman and A. I Dean (Jl. Cutaneous Dis. June, 1919,367 ; Pres. Feb. 21,86), poin to reactions having been caused with subsequent improvement.

The Ethyl Esters of Hydnocarpus (*Wightiania* and *Anthelmintica* and Ethyl Chaulmoograte in conjunction with Iodine have also bee employed (*v. infra*).

The preparation permits of the simultaneous use of *all* the acids o the oil, both high and low melting in the form of an injection into th tissues, but we are a little in the dark as to why the ethyl esters shoul be any more suited for the purpose than the Glyceryl Esters, which o course constitute Oleum Chaulmoogræ. To us these Ethyl Ester appear to be chemically too stable—little likely to be split up an absorbed.

The preparation remains in the cells for months, hence mild irritative effect A desirable psychological effect.—E. Muir, L. i./31,1401. Sir L. Roger found the effect too irritating.

The efficacy of Chaulmoogra in leprosy lies, apparently, not in the use o the Ethyl Ester, but in that of the whole oil, preferably in conjunction wit Pyrogallol Oxide.—T. C. Ghosh, L. i./23,630.

Leprosy in Hawaiian Islands. Most prevalent during school age and mos common in male sex. Ethyl Esters of Chaulmoogra Oil of benefit in most cases.—W. T. Corlett, per Jl. Trop. Med., Jan. 1, 23,13.

24 out of 300 lepers cured, and 30 convalescent with Ethyl Esters.—K. Shiga, I.M.G., July, '26,355.

Iodised Ethyl Chaulmoograte containing 2% Iodine.

Dose.—1 Cc. intramuscularly has been reported on. See Edn. XIX, p. 610, but to our mind there can be no great advantage in the compound.—See also H. W. Wade and C. B. Lara, L. i./27,599.

Treatment of Leprosy with Hydnocarpus Oil and its preparations.

Oleum Hydnocarpi (*P. Off.*).

Obtained from seeds of *H. Wightiana, Blume.*

The pure oil 2·5 Cc., has been given twice weekly and increased by 0·5 Cc. in leprosy. The oil is tolerated well if injected into healthy subcutaneous tissues and only a very few lepers showed the mildest reactions.—Col. Med. Report, No. 209 (Straits Settlements), p. 41, per Jl. Trop. Med., June 1/27. The oil is however not suitable for intradermal infiltration over large area. Ester preferable.—E. Muir, L. i./31,1401. See further abst. under Sodium Chaulmoograte.

Hydnocarpus Oil, combining 4% Creosote, the cheapest and most effective remedy, and the one which did the maximum amount of good in all stages.—R. G. Cochrane, R.S.M. Discussion, B.M.J. i./27, 285.

Sodium Hydnocarpate.

A preparation obtained from the low melting fraction of *H. Wightiana* Oil has been used in leprosy, preferably 1% solution in 10 Cc. dose. Sir L. Rogers, Proc. Roy. Soc. Med. 1927, Vol. XX, Sect. Trop. Diseases, p. 146 *et seq.*

Creosoted Hydnocarpus Oil and its esters are the most useful, economical and painless preparation. Sodium Hydnocarpate is specially convenient, but apt to cause endophlebitis and block the veins when given intravenously. The last Indian Census, 1921, gave the number of lepers as 102,513, but it is believed there are 4 or 5 times that number infected. Removal of predisposing causes, causing lowering resistance of patient, are important. Erythrocyte sedimentation test is useful in determining degree of resistance. Desirability of further botanical research into possibility of introducing hydnocarpus trees in British Possessions in Africa where leprosy is rife—the fresher the seeds the more active the therapeutic action of the oils.—E. Muir, per B.M.J. ii./30,1095.

Recent advance in treatment of leprosy and its bearing on prophylaxis.—Sir L. Rogers, Pr., April, '28,209.

Sodium Hydnocarpate "Sterules" 10 Cc. of 1% solution are prepared.

✱ **Alepol** (T.M. 478,936). A selected fraction of the Sodium Salts of Hydnocarpus Acids.—P.J. i./28,209; Ind. Jl. Med. Res. Oct., 27, p. 501; L. i./28,73.

Dose.—1 Cc. of a 3% solution (increased) intramuscularly or subcutaneously; intravenously 1 Cc. of 1% solution increased by 1 Cc., up to 5 or 10 Cc.

Intravenous injections up to 10 Cc. of 5% solution the method of choice in 'mass' treatment in the Yambio District of the Belgian Congo. Locally, Acid Trichloracetic is used and ulcers dressed with Hydnocarpus Oil.—A. Cruickshank, Lep. Rev., Jan., '32,6.

Ionisation.—Ionisation of the nasal mucous membrane, using Alepol, Potassium Iodide and Sodium Chloride, in 1% solution, produces in many cases apparently complete cure of leprotic lesions in this site, an electrode being placed in each nostril and kept in position by bandages, and a current of 20—30 m.a. passed for 20—30 minutes.—F. G. Rose (Mahaica Leper Hosp.), B.M.J. i./29,148.

Ethyl Hydnocarpate. *Syn.* HYDNESTRYLE, HYDNOCREOL (with 4% Creosote).

Esters of Hydnocarpus Oil (*H. Wightiania*), with equal quantity of Olive Oil, in doses from 0·5 to 10 Cc. intravenously or subcutaneously twice weekly, satisfactory in early cases of leprosy. Of no value where permanent lesions already exist. Effect enhanced by adding Creosote or Thymol to solution.—E. Muir, Ind. Jl. Med. Res., Oct. '24, per B.M.J.E. i./25,7.

This method, using Creosote 4% of the Mixture and subcutaneous infiltration twice weekly, initial dose ½ Cc. as stated, increasing by ½ Cc. has success in India.—R. G. Cochrane, L. ii./26,95.

Found useful at Dichpalli, Hyderabad. Of 180 patients treated in 1923-24 17% were symptom-free, 45% improved and likely to be symptom-free, 35% improved and 3% worse or dead. Of infective cases 63% have become non-infective.—Isabel Kerr, L. ii./25,373. *See also* Proc. Roy. Soc. Med., 1927, Vol. XX, Sect. Trop. Diseases, p. 135 *et seq.*

The toxic action of Chaulmoogra Oil appears to be due to esters of Hydnocarpic Acid. Ethyl Hydnocarpate intravenously into rabbits causes lower Calcium content of blood, with associated hyposensitivity, followed by incoordination, death following respiratory failure. The toxic dose is 0·5 Cc. per kilo. for rabbits.—B. F. Read, Jl. Ph. and Exp. Therap., '24, p. 221.

Ethyl Esters of ***H. anthelmintica*** in prophylactic treatment of leprosy are used in the colonies of the Federation of Indo-China. 1st week. 1 Cc. is injected; 2nd week, 1·5 Cc.; 3rd week. 2 Cc.; until a dose of 5 Cc

is reached. Results sufficiently favourable for lepers to ask for injection instead of rebelling against treatment as formerly.—Presse Médicale, p Jl. A.M.A. ii./25,206. See also item 931.

Intradermal injections of Chaulmoogra and Hydnocarpus Esters should b accompanied by intramuscular to produce maximum effect. Big dos should be pushed where resistance is high—but doses above 10 Cc. harmfu —R. Cochrane, T.R.S.T.M., Aug., '31,98.

Hydnocarpus Oil and its Preparations injected intradermally, the action largely due to the local irritation, which continues for some time, the este remaining absorbed inside the local cells, causing breaking down and phago cytosis of the lepromatous material. There might also be some antigen action.—E. Muir, T.R.S.T.M., Aug., '31,92.

Hydnocarpus Nut, Powdered.—The main treatment in an asylum in th Malay Peninsula. A popular Chinese remedy, palatable and inexpensive.— E. A. O. Travers, R.S.M. Discussion, B.M.J. i./27,285.

Further References on the Treatment of Leprosy.

Leprosy—Diagnostic Tests.

Description and technique of the Histamine Test, which has prove successful.—Lep. Rev., Jan. '32,18,28. Also the Muller-Ballung' Reaction.—*ibid.*

International Conference in Manila, January, 1931. The nam *Mycobacterium leprœ* to replace *B. leprœ. H. Wightiana* and *H Anthelmintica* Oil, in form of Ethyl Esters, and Sodium Salts mentioned. No special drugs definitely recommended.—R. G Cochrane, B.M.J. i./31,681.

British Empire Leprosy Relief Assn. Report, 1930.

Shows the work of the Association and the vast area covered. In the year 1929-30 over 400,000 doses of anti-leprotic drugs were dispensed.

Leprosy in Nigeria.

A comprehensive survey of the problem. Introduction of leprosy thought possibly due to introduction of ***Mohammedan Civilisation.*** The Mohammedan fatalism, prolonged drought, overcrowding, slave trading, the Annual Feast, and the indifference of the natives, are important factors in the prevalence of leprosy.—T. F. G. Mayer, Secretary, Nigerian Bch. British Emp. Lep. Relief Assocn. (Lagos), 1930.

A Self-Healing Disease.—Comparison with the well-known self-healing diseases—lobar pneumonia, enteric and small-pox. In these latter there is a short incubation period, rapid onset and rise to a climax when immunity has become sufficient to cause more or less rapid diminution, the whole course being finished within a comparatively few days. In leprosy there is a similar process spread over as many *years.* Treatment has to depend on stages of the disease.

In the first stage the disease is present in limited form, with few bacilli in the body, little or no immunity and either diminished general resistance (temporary or permanent) or the presence of some other condition which is favourable to the increase of the disease. Diagnose and remove whatever diseased condition, environment or unsuitable diet is lowering tissue resistance. Induce immunity by injection of antigens. Defatted acid-fast antigens may be useful. Destroy the bacilli by injections of fatty acids—the **esters of the fatty acids of hydnocarpus—and chaulmoogra oils** specially useful. Counter irritation by infiltrating esters into the subcutaneous tissue under skin and nerve lesions, or by external use of 1 to 3% **Trichloracetic Acid** painted on to lesions every 6 or 10 days.

In the second stage—the same remedies, but with care. The bacilli are plentiful and there is danger, in the absence of acquired immunity, of further dissemination.

In the third stage. Where a fair degree of immunity has occurred all the above forms of treatment should be pressed. When large injections of the esters do not produce sufficient reaction give *Potassium Iodide*, beginning with ½ grain a day to limit of tolerance.—Ernest Muir, L. i./24,277.

Chaulmoogric Acid 'C' Injection. *Martindale.*

Arising out of the last-mentioned we suggest our low melting acid fraction *as such* or indeed *total* acids without neutralising or reconverting into esters. These preparations should prove reactive and, experience suggests, not too reactive, but neutral material as our Sodium Salt *antea* is obviously better.

Suggested Dose.—A 5% solution in Almond Oil of our 'C' fraction forms a slightly opalescent liquid without actually separating. *Doses* of 0·05 to 0·2 Gm. in the diluent mentioned would be worthy of trial.

Vaccine Treatment (J. Hasson) of a case of acute nodular leprosy originating in this country completely successful.—E. Graham Little, B.M.J. ii./26,1034. *See also* Criticism *ibid.* 1196. The action of Chaulmoogra preparations in leprosy is very unreliable and limited in scope.—J. Hasson, B.M.J. i./27,40. Results from the use of these preparations seem propitious in proportion to the remoteness of the reporter.—E. Graham Little, B.M.J. i./27,40.

Vaccinotherapy should be used, particularly in the more recent and acute cases. Initial dose 50 mill., intramuscularly or intravenously, increased to 500 mill., with varying interval between injections. In the florid type intramuscular injections given at 5-day and intravenous at 7-day intervals, and in the mixed or anæsthetic types intramuscular at 3-day intervals and intravenous 6-day. Reaction occurs 4 to 5 hours after, usually of short duration. An intramuscular course consists of 12 to 30 injections and an intravenous from 6 to 10. The course is followed by a month's rest, then a course of Sodium Chaulmoograte and a further month's rest before repeating.—Antonio Marras, '*La Terapia della Lepra ed i Risultati Ottenuti coi Moderni Trattamenti*' (University of Cagliari, 1929), pp. 155—157,255,256.

Leprosy—Symptoms, Diagnosis, Treatment, and Prevention—by Sir L. Rogers, 2nd Edition.—L. i./30,518.

Calcium in Leprosy, see Therapeutic Index.

***Avenyl** (T.M. 469632). For the treatment of leprosy complicated by syphilis. Hydnocarpus Oil with 0·25% of 2-Myristoxymercuri-3-Hydroxybenzaldehyde. *See* B.M.J. ii./27,102.

OLEUM EUCALYPTI.

Dose.—$\frac{1}{2}$ to 3 minims (**0·03 to 0·2 Cc.**) on sugar, emulsified, or mixed with olive oil. U.S. *average dose* 8 minims.

Eucalyptus Oil is distilled from the leaves of numerous species of Eucalypti. The oils which contain the greatest percentage of Eucalyptol are used chiefly for pharmaceutical purposes and the species now being distilled for oils of this class are *E. Polybractea, E. Cneorifolia, E. Odorata, E. Smithii, E. Globulus, E. Australiana, E. Oleosa,* and a few others. As the yield of oil varies greatly with the several species this is a controlling factor. The rectified oils of *E. Polybractea* and *E. Australiana* are water white, those of the other species mentioned are tinged slightly yellow when freshly distilled. Oils which contain as much as 70 to 80 per cent. Eucalyptol are now well known, *e.g., E. Polybractea, E. Smithii,* etc., and have a pleasant, fragrant smell. The oil from *E. Citriodora* has an odour resembling

Lemon-grass. Mr. George Inglis Hudson, of Glebe, Sydney, Australia, was good enough to assist us in this Chapter. Mr. H. G. Smith has done useful research in Eucalyptus Oils.

The oil ozonizes the atmosphere whilst oxidising. The pinenes contained have the principal action in this direction. Sp. Gr. 0·910 to 0·930. It should not cause coughing when inhaled—absence of volatile aldehydes.

Soluble in oils, fats, paraffins, about 3 in 1 of 90% alcohol, in about 3 to 5 vols. of 70% alcohol and in all proportions in absolute alcohol.

Uses.—Antiseptic, a popular prophylactic, inhaled or sprayed for influenza and bronchial catarrh. Useful mixed with an equal quantity of olive oil as a rubefacient for rheumatism.

CHOLERA EPIDEMICS.—Eucalyptus Oil 10 minims twice daily has a definite prophylactic effect.—Brooke.

MEASLES.—**Milne's Method** was to rub the Oil over the body excepting face and hands, morning and night for the first four days, afterwards once a day until the tenth day. Tonsils and pharynx to be swabbed with 10% Carbolic Oil every two hours for first 24 hours or irrigate mouth and throat daily with weak Alum Lotion and Glycerin of Borax applied to interior of mouth and to the gums. Mortality lowered.

TYPHOID FEVER treated by 10 minim doses. Reduction in temperature.

ANKYLOSTOMIASIS treated—Eucalyptus Oil 2 Gm., Chloroform 3 Gm., Castor Oil 40 Gm. *Dose.*—¼ to ½ according to age and condition of patient. Also successful for tapeworm and threadworm, but we doubt if specific—see Ol. Chenopodii.

Colds are treated by steam inhalation with the oil, also internally 10—15 minims on sugar every 3 or 4 hours. See also Oleum Cinnamomi.

Poisoning effects from 1 to 6 drachms are recorded. Effects were gastro-intestinal irritation and cerebral paresis with vomiting and diarrhœa. Treatment by external stimulation, as on the lines of Opium poisoning.

Eucalyptus and castor oil taken in error for plain castor oil. Three doses of Camphor given hypodermically. Recovery.—L. M. Chesney, L. i./26,131.

A pugilist took 3 drachms, as suggested by a 'drop.' Intense drowsiness—complete hypnotic effect.—P. C. Garrett, B.M.J. i./25,1172.

Poisoning caused by about ½ ounce. Cyanosis. Strychnine 1/60 grain hypodermically and Mustard 2 drachms by the mouth: after vomiting, stomach lavage.—P. Gibbin, B.M.J. i./27,1005. See also *ibid.*, 1133, and A. Neale, B.M.J. ii./27,520.

Eucalyptol, U.S., FR. CX., F.E.—*Syn.* CINEOL; CAJUPUTOL.

$C_{10}H_{18}O$=154·1404. *Dose.*—1 to 4 minims (**0·06 to 0·25 Cc.**).

Is that portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 0° C. It is preferred to the crude oil for use in oro-nasal inhalers. It may be obtained from the oil by the action of phosphoric acid (Faulding's Process), with which it forms a crystalline compound.

Eucalyptol Phosphate. On addition of water, this splits up setting free Eucalyptol. It is however not difficult to prepare Eucalyptol by **Freezing.** The Eucalyptol made by the cooling process is of absolute purity.—G. I. Hudson.

Tinctura Eucalypti (Foliorum). *Dose.*—15 to 120 minims.

Eucalyptus leaves in No. 20 powder in alcohol 60% 1 in 5.

Hæmorrhage from superficial wounds is stated to be capable of arrest by internal use of calcium chloride combined with local application of this tincture.

Pigmentum Olei Eucalypti et Acidi Salicylici.
Eucalyptus Oil 8, Salicylic Acid 1, Olive Oil to 64.
Eczema capitis treated by rubbing into the scalp twice a week.

Unguentum Eucalypti et Acidi Borici.
Eucalyptus Oil 40, Boric Acid 120, Soft Petroleum to 500. Lessens secretions of rhinitis.

Vapor Eucalypti, T.H.
Eucalyptus Oil 20 minims, Light Magnesium Carbonate 10 grains, Water to 1 ounce. A teaspoonful in a pint of hot water. (**Vic. Park** has double quantity of oil.)

Vapor Eucalypti Compositus, R.F.H.
Eucalyptus Oil 2, Compound Tincture of Benzoin 3, Thymol 1. Spirit of Chloroform to 8. 10 drops at a time to be inhaled through an inhaler, *e.g.*, the "Ozonic."

Nebula Eucalypti Composita.
Form A.—Eucalyptus Oil 5 minims, Cinnamon Oil 2 minims, Menthol 12 grains, Liquid Paraffin containing 2% Aristol to 1 ounce.
Form B.—Eucalyptus Oil 5 minims, Wintergreen Oil 5 minims, Menthol 5 grains, Liquid Paraffin to 1 ounce for a common cold.

***Eumenthol** (T.M. 297687, 301214) **Jujubes (Hudson).**
Contain the active constituents of *E. Polybractea* Oil, *Thymus Vulgaris*, *Pinus Sylvestris*, *Mentha Arvensis* with Benzo-borate of Sodium. Antiseptic and effective.

OLEUM MORRHUÆ.

Syn. **Oleum Jecoris Aselli,** P. Belg. IV., F.E. VIII.
French—*Huile de Foie de Morue.* German—*Lebertran.*
P. Ital. V.—*Olio di Fegato di Merluzzo.*
Dose.—1 to 4 drachms (**4 to 15 Cc.**).

The oil (*P. Off.*) is pressed from codfish livers, *Gadus morrhua* and filtered at about 0° C.—previously heating and cooling was adopted. Inferior brands are prepared by heating.

U.S. X. states 'and other species of *Gadus.*' The oil may be assayed for Vitamin 'A' potency and should then contain at least 50 units per Gm.
For Characters and Tests, see Vol. II.

Soluble.—1 in 2 of Ether, slightly in alcohol.

Flavoring.—Syl Lavandulæ, Glyl Pini, or as Emulsion.
See also **Oleum Morrhuæ Aromat.** *p.* 613.

Uses.—Nutritive, nervine tonic given in rickets, phthisis, chronic bronchitis, general debility and malnutrition.

Cod Liver Oil is rich in **Vitamins 'A' and 'D.'** For its use in rickets and other Vitamin deficiency diseases the chapter on **Accessory Food Factors** should also be consulted.

Concentrated Vitamin preparations are obtained from the ***unsaponifiable portion*** (*see* p. 613). *For Vitamin D Preparations see Vitamin Preparations of Commerce. Vitamin Assay Methods—Vol. II.*

Relative richness in Vitamins: *Scottish Oils* rank first, then *Newfoundland*, then *Norwegian.*—**Imperial Committee on Marketing Foodstuffs.**

The **dog-fish** produces oil containing twice as much Vitamin 'A' as Cod Liver Oil, and the common European shark an oil with 8 times as much.—Per L. i./31,566.

'Unsaturated' Fatty Acids.—The older theory of the late O. T. William and others was that in tuberculosis the **value of Cod Liver Oil** depends on the fact that the liver has the power of decomposing fats and yielding these acids to the blood. These have chemically a loose double linkage and are capable of exerting chemical action more markedly. Fish, particularly Cod Liver, and vegetable oils are ***richer in these constituents than animal oils.*** The effects of Cod Liver Oil on the acid-fast properties of the tubercle bacillus showed that the oil had attacked the waxy coating of the bacillus and rendered it non-stainable by the usual methods.

For this and other aspects (Nitrogen Metabolism), see Vol. II.

TRYPANOSOMIASIS.—It has been reported on (in conjunction with organic arsenic) favourably. Should be tried in a large number of cases.—Bagshawe.

TYPHOID FEVER.—Cod Liver Oil appreciably diminishes mortality.—Pe Jl. Trop. Med., Mar. 2, '25,115.

RICKETS.—One of the benefits of Cod Liver Oil is due to its forming a soluble soap with calcium.—B.M.J. i./11,500. (Subsequently the Vitamin conten theory had support and *more* recently Cod Liver Oil *plus* Lime. For further information, see Vitamins).

Promotes gain of strength and height and is better than milk for growing children.—Danish Investigation.—B.M.J. i./30,79.

Tuberculosis. Blood Calcium.

Dietetic conditions influencing the calcium content of the saliva. A high calcium content can be produced by a diet having a large fat soluble Vitamin content; a low calcium content by a diet with much cereal and little fat soluble Vitamin. Tuberculous children appear to have a lower calcium content than normal.—C. Lee Pattison, B.M.J. ii./26,6.

Taking the Oil increases blood Calcium—decreases the coagulation time. Pulmonary hæmorrhage with increased coagulation should benefit. As Calcium salts *per os* caused rise of blood Calcium, intravenous injections of Calcium salts not needed.—Jl. A.M.A. ii./25,66.

When a patient is for any reason on a '+ Lime' diet Cod Liver Oil should be given.—*Cf. Digestive Tract*, p. 250.

Capsules of Cod Liver Oil 19 minims **and Creosote** 1 minim are for use in phthisis, also made plain, 20 and 30 minims.

Emulsio Olei Morrhuæ (50%).—*Martindale.*

Dose.—2 to 8 drachms (**7 to 30 Cc.**).

Soak Irish Moss 2 drachms in Water 12 ounces, six hours, boil and strain off 10 ounces. Allow to cool and add in three portions Cod Liver Oil 12 ounces. Then add Simple Tincture of Benzoin 1 ounce, Alcohol 90% 1 ounce, Essential Oil of Bitter Almonds 10 minims, Elixir of Saccharin 10 minims. This produces a good white preparation.

Ferrated Emulsion of Cod Liver Oil consists of the plain Emulsion with Citrate of Iron and Ammonium 5 grains per ounce.

Emulsion of Cod Liver Oil with Glycerophosphates, *v.* p. 37.

Emulsio Olei Morrhuæ et Hypophosphitum.

Dose.—2 to 8 drachms (**7 to 30 Cc.**). Contains the Hypophosphites of Sodium and Calcium, of each 1%, in the form for **Emulsio Olei Morrhuæ** *antea.*

Emulsio Olei Morrhuæ cum Lecithin is the above with 5 grains of Lecithin per ounce. *Dose.*—2 to 8 drachms (**7 to 30 Cc.**).

The Lecithin is to be incorporated with the above finished Emulsion. Pharmaceutically, it is elegant and palatable.

✱**Morelix** (T.M. 457559). A combination of Cod Liver Oil with Malt, Hypophosphites, Virginian Prune, and Aromatics. A nutritious tonic.

Emulsum Olei Morrhuæ, U.S. X.—Mix Acacia Gum 125 with Cod Liver Oil 500, then add at once Water 250 and emulsify. Add Methyl Salicylate 4 (or other flavouring, *q.s.*) and Syrup 100, and Water *q.s.* to 1,000.

Emulsio Olei Jecoris Ferrata.—P. Svec. X. has Cod Liver Oil 300, Calcium Hypophosphite 6, Citric Acid 2, Iron Pyrophosphate with Ammonium Citrate 9, Gum Acacia 53, Syrup 60, Vanillin 0·6, dissolved in Dilute Alcohol 5 and Water to 600.

Oleum Jecoris cum Iodo. *Syn. Olio di Fegato di Merluzzo Iodato.* P. Ital. V. Contains 0·05% Iodine dissolved by trituration.

Oleum Morrhuæ Aromaticum.

Dose.—1 to 4 drachms.

Coumarin 0·01, Saccharin 0·5, Vanillin 0·6, Absolute Alcohol 10·0, Lemon Oil 20·0, Peppermint Oil 3·0, Cod Liver Oil to 1,000. The taste is covered but the odour persists to some extent.

✱**Oviol** (T.M. 429023). A preparation containing 52% Norwegian Cod Liver Oil with eggs.

Cod Liver Oil Vitamin Concentrate.

Preparations containing antirachitic Vitamins of Cod Liver Oil in a concentrated form are made by separating the unsaponifiable fraction of the oil.

The oil is extracted with Formic or Acetic Acid, and the acid extract, amounting to about 5%, is saponified with Alcoholic alkali. The soaps are extracted with Ether. This extract gives on evaporation a brown residue (about 0·1% of the oil). Air being excluded: the product is stable for seven or eight months. A 1 Gm. tablet may be made representing the therapeutic activity of a tablespoonful of the oil.—P.J. ii./25,394.

An Ether solution of a concentrate of Cod Liver Oil intramuscularly in rickets had similar effect to the oil given *per os.*—Per Pr., Mar., '27,199.

✱**Ostelin** (T.M. 447886).—Contains Vitamin 'D,' responsible for Calcium-Phosphorus metabolism. 4 minims of it are equivalent to 1 drachm of Cod Liver Oil. Available in Glycerin and in Malt Extract and Orange Juice, containing the equivalent of 50% Cod Liver Oil: and in tablets containiug 4 minims with Calcium Glycerophosphate 2 grains.

✱**Oscodal** (T.M. 480078).—In tablets. *Dose.*—½ to 2. Adults 2 to 3, thrice daily. Stated to contain Vitamins 'A' and 'D.'

✱**Codlivex** (T.M. 460647).—Stated to represent the active principles of the oil in the form of Milk Chocolate Pastilles which contain the lipoid of the Cod Liver. One is equivalent to one tablespoonful of Cod Liver Oil.

✱**Moruette** (T.M. 455426) **Cod Liver Oil Tablets** are prepared on similar lines. They contain the fat-soluble Vitamin 'A,' alkaloids of the Leucomaine class, Cholesterol and Lipochrome-containing bodies, also Phosphorus, Bromine and Iodine.

Sodium Morrhuate.

Dose.—*Subcutaneously* ½ Cc. of a 3% solution slightly increased up to 2 Cc., two or three times a week until reaction (febrile and local) occurs. When 2 Cc. has been reached give this dose *intravenously* up to 4 Cc.

For *intravenous* use as a sclerosing agent, *v. postea.*

Sodium Morrhuate consists of the Sodium salts of the acids of Cod Liver Oil, usually purified by means of Ether.

Chemical Examination.—The compound on dissolving in water should produce a clear solution. On acidifying with Hydrochloric Acid in the presence of Ether the acids removable by evaporation are *pale yellow in colour* and have M. pt. 15–19° C., and Iodine

value 143 to 150. There should be *no resinous matter* insoluble in Ether.—By our Expts. 1931.

It should be noted that Cod Liver Oil of good quality consists of about 70% Triolein with about 25% Tripalmitin, a little Tristearin, and a number of glycerides of other acids in small proportion. By a process of fractional precipitation the author has *removed the Palmitic and Stearic Acids*, thus retaining the 'Unsaturated' acids.

GANGLIA treated by Sodium Morrhuate injections 5%, 0·2 to 5 Cc., after aspiration.—Peter McEvedy, L. ii./30,902.

HÆMORRHOIDS injected with Sodium Morrhuate.—A. S. Ross, B.M.J. ii./30,86.

Sir L. Rogers first used Sodium Morrhuate in Calcutta in 1918 in leprosy and tuberculosis. 3% or more causes strictly localised mild inflammation of the vein wall, followed by firm fibrous occlusion of the vessel. Neither the Hydnocarpate nor Gynocardate nor Morrhuate increase coagulability of the blood, so there appears to be no danger of embolism resulting. 5% solutions probably best.—B.M.J. ii./30,120.

LEPROSY.—Improvement in 2 or 3 cases after 2 or 3 injections of Sodium Morrhuate.—W. W. Cadbury, per T.D.B. 17/21,279.

LUPUS.—3% solution intramuscularly, beginning with 0·5 Cc. increased to 3 Cc. gave striking results—the lesions completely involuted in 4 months.—B.M.J.E. i./29,98. See also Sir L. Rogers, B.M.J. i./21,640.

TUBERCULOSIS.—The unsaturated fatty acids of this and Chaulmoogra Oil act in some way on the coating of the bacilli: the coating of these contains unsaturated fatty acids.—Sir L. Rogers, B.M.J. i./19,147.

Animal tuberculosis. Sodium Morrhuate, Soyate and Hydnocarpate of no avail.—Sir L. Rogers, Pr., Aug., '21,98, but see also B.M.J. ii./23,1251.

Sclerosing Agents for Varicose Veins.

Sodium Morrhuate has been employed for this purpose on the recommendations of numerous physicians.

Dose.—5% solution is most used. Eight injections, giving ½ to 1 Cc. at each puncture, are spread over a fortnight, the average total dose being 4·5 Cc. Good results. As a rule, except in the largest veins, there is no reaction or pain, and the swellings which may arise are diminished or gone within a week. In cases where there is no immediate result, further treatment is delayed for a month, when the veins usually become occluded or diminished in size—in the latter case an injection of 10% solution usually obliterates the veins.—P. B. Kittel, 'Hæmodynamics,' 1929.

Technique.—A tourniquet is placed above the vein to be injected. With the patient standing, the injections are made throughout the length of the vein from above downwards.

Sodium Morrhuate Sterules, 3%, ½, 1 and 2 Cc., also 5 and 10% 2 Cc. are prepared.

Used with success in 187 cases. Free from general toxic effects and local complications slight. As free from pain and discomfort as can reasonably be expected and duration of treatment the briefest possible. Injections of 0·5 to 1 Cc. of 5% solution with patient standing. Treatment given weekly.—T. T. Higgins and P. B. Kittel, L. i./30,69.

Used for veins and hæmorrhoids with good result.—A. Stanley Ross, B.M.J. ii./30,86.

Sodium Morrhuate for veins not entirely free from danger.—A. H. Winchester, B.M.J. ii./30,120. Urticariform wheals with pain for a week.—T. H. Treves-Barber, *ibid.*, 60,195.

Indolent ulcers—possibly a quarter of a million cases in the U.K. Sodium Morrhuate 5% used for veins. Very tight bandaging.—A. Dickson Wright, L. i./31,457. See also B.M.J. ii./31,561.

Sodium Morrhuate (2 Cc. average for each injection), 10% found more suitable than 5%. The latter will do for small veins. Patient seated in chair and no constricting bandage for at least 3 hours after injection. Less toxic than Quinine-Urethane.—F. A. E. Silcock, B.M.J. ii./30,303.

5%—less irritant than other solutions and does not cause sloughing in subcutaneous tissues. Painless.—D. Levi, L. ii./30,16.

Has any case of embolism been recorded after an injection for varicose veins? The clots formed by Sodium Morrhuate, etc., do not cause emboli. Patients should not be put to bed.—W. W. Jeudwine, B.M.J. ii./30,933.

Safest and most effective a 20% Sodium Chloride solution with an active material from saponified Cod Liver Oil, with standardised surface tension of 0·8 and pH 9–9·3, and containing about 0·15% of the Sodium Salt of some resinous compound. 0·5 to 2 Cc. obliterates from 3 to 30 cm. of vein. Normal dose for a vein 5 Cc., and up to 30 Cc. given at one sitting. Relatively slight pain.—T. H. Treves-Barber, B.M.J. i./32,143. *We cannot agree with regard to the pain.*—W. H. M.

Sodium Morrhuate thought to lead at times to immediate thrombus formation.—Reginald Payne (St. Bart's), B.M.J. i./32,237.

See also matter on Sodium Salicylate and Combinations, also Quinine Urethane for Varicose Veins.

Cod Liver Oil Substitutes. *See* **Maltolivine, *Marrubin** (T.M. 261511), **Emulsio Olei Olivæ, Syrupus Tann-Iodo-Phosphoratus.**

The following oils have a high Iodine value due to the degree of unsaturation and hence are of therapeutic value.

Cod Liver Oil 126—166.	Soya Bean 122.
Poppy Seed Oil 138·1.	Maize Oil 111.
Sunflower Seed 136·1.	

Poppy Seed Oil is sold as *Salad Oil* (Huile d'œilette). **Emulsio Papaveris.** *Syn.* *Pavimol (T.M. 362836) contains it. *Dose.*—½ to 1 ounce thrice daily—it has been used in malnutrition.

It is possible that the hardihood of the Italians is attributable to the amount of unsaturated oil they consume.—W. H. M.

The vegetable oils contain no Vitamins 'A' or 'D'.

Dugong Oil from species of halicore, sebaceous animals inhabiting the rivers and bays of N. and E. Australia may have some value.

It is superior to Cod Liver Oil and sometimes used by inunction.

Mutton Bird Oil as a substitute for Cod Liver Oil—the oil of the young Sooty Petrel collected on the Stewart Island south of New Zealand advocated for feeding in phthisis and bronchitis.—J. S. Purdy, B.M.J. i./18,174.

OLEUM OLIVÆ.

Dose.—¼ to 1 ounce (**8 to 30 Cc.**).

The oil expressed from the ripe fruit of *Olea europæa* (*Oleaceæ*).

Inferior brands are obtained by addition of the pulped fruit to boiling water and by fermentation processes. *For detail of Tests see Vol. II.*

Thousands of tons of Olive Oil are sold with B.P. quality guarantee—most of it could never be eaten or used medicinally internally.—C. E. Sage, P.J. ii./30,2. We entirely agree. It is of interest that the best quality Olive Oil bought here makes a bad salad dressing, while on the Continent the cook has no difficulty in producing edible dressing for lettuce.—W. H. M.

Uses.—Olive Oil is a nutrient and has laxative properties (*vide infra*). Often gives relief to patients who have gall stones. It is frequently used warmed to about 90° F. as rectal injection, as much as 10 ounces at bedtime for constipation. In typhoid ½ ounce doses *per os*, and a breakfast-cupful by the bowel daily gives great relief.

Capsules (Gelatin) of Olive Oil, each containing ½ drachm.

These capsules are also prepared **Formalised** (**Formagules**) for lubricating the intestines in cases of habitual constipation.

In gastric ulcer given by stomach tube if necessary it may inhibit the secretion of hydrochloric acid. Hyperchlorhydria is generally associated with gastric ulcer. It can be given for long periods and is harmless.

Chronic colitis treated with from 8 to 10 ounces of washed Olive Oil, warmed to 100° F., injected per rectum at low pressure and retained all night—injections should be continued nightly for a fortnight.—L. ii./23,1411.

A tablespoonful flavoured with Peppermint before meals of value in digestive disorders and heartburn.—W. Morrell Roberts, Qtrly. Jl. Med., Jan., '31, per L. i./31,537.

Enema Oleosum L.H.

Olive Oil 4, Soft Soap 1, Warm Water 16.

Emulsio Olei Olivæ. *Dose.*—1 to 2 ounces.

Olive Oil 1 ounce, Gum Acacia Powder 25 grains, Simple Syrup ½ ounce, Water to 4 ounces.

Sterilisation, see Sterilised Olive Oil, p. 148.

Maltolivine. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**).

A combination of Olive Oil and Malt Extract, as a substitute for Cod Liver Oil. A nutrient in emaciated and wasting conditions and in colitis of children.

OLEUM RICINI.

Dose.—1 to 8 drachms (**4 to 30 Cc.**).

Expressed from seeds of *Ricinus Communis* (*Euphorbiaceæ*). ***Soluble*** about 1 in 4 or less of Alcohol 90%. Also soluble in ether and glacial acetic acid. Sp. Gr. 0·958 to 0·970. (*B.P.* '14.) Saponification No. 180, Iodine No. 84. (P.Ital V., 176-186 and 82-91 resp.). The seeds, but not the oil, contain the poisonous protein Ricin; the 'press cake' therefore is poisonous. The purgative action is due to the fatty acids, of which ricinoleic is a principal member.

(**Ricin.**—A vegetable toxin or toxalbumin is tremendously potent. When small doses are injected hypodermically immunity is produced, antiricin being formed. This fact paved the way for the foundation of serum therapeutics.—P.J. i./15,156.)

Ricin has two biological functions—one toxic, and the other antigenic. Potassium Permanganate, Hydrogen Peroxide (30%), Ozone, Chlorine, Bromine, Iodine and Ultra-Violet Rays, all destroy the toxic properties without affecting the antigenic. Ricin partially oxidised by Potassium Permanganate, when injected into rabbits, developed in them so **great an immunity against untreated Ricin** that after 2 or 3 weeks they were able to receive 100—120 times the normal lethal dose, and 0·25 Cc. of serum from these rabbits protected mice against a fatal dose of Ricin.—E. B. Carmichael, Jl. Ph. and Exp. Ther., Mar., '29,193—238.

Total acidity of the oil (as oleic acid) should not exceed 1%.

Pharmaceutical Oil as distinct from Soapmakers' and other industrial oil does not deposit in cold weather.

Limits of Petroleum Spirit Test of solubility of Castor Oil too wide to be of use.—P.J. ii./29,11.

Flavoring.—Prescribed as Oleum Ricini Aromaticum, or with 2 drachms of Tinctura Cardamomi Composita to the ounce, or in capsules, or as 'Maricol.'

Uses.—A mild but effectual purgative rarely causing pain. It is rendered more efficacious when mixed with an equal quantity of Glycerin. The oil rubbed on the breasts will often increase the flow of milk. Castor oil is a soothing application to the conjunctiva, and is employed for making solutions of the alkaloidal bases (*q.v.*).

In sprue 1½ drachms every morning.—Cantlie, B.M.J. ii./05,1281.

Pharmacology.—It passes the stomach unchanged; on reaching the small intestine it is saponified by the alkaline pancreatic secretion, being converted into Glycerin and Ricinoleic Acid. This acid is irritant to the epithelium of the intestine thus causing impulses to pass to the local nerve plexus and then to the wall of the intestine. This causes the muscle to contract more—that is, increases the peristaltic movement of the intestine, and thus the contents are hastened on. If the oil were given saponified the Ricinoleic Acid would cause irritation and produce vomiting.—D. Grieve, P.J. ii./21,490.

Capsules of Castor Oil contain ½ or 1 drachm.

Capsules of Castor Oil, Compound, contain Croton Oil ¼ minim, with Castor Oil 8 minims. *Dose.*—One or two.

'**Castor Oil Pills**' have contained Calomel without any Oil.

"**Compound Castor Oil Pills**" a proprietary contained vegetable laxatives, chiefly Aloes, with Castor Oil 5% at most. Renamed "**Compound Laxative Pills,**" etc., with statement as to content of Castor Oil.—P.J. i./31,388.

Enema Olei Ricini.—Castor Oil 1, Olive Oil 4. *Dose.*—5 to 10 ounces.

Oleum Ricini Aromaticum. *Dose.*—1 to 8 drachms.

Vanillin 1 grain, Peppermint Oil 10 minims, Saccharin 4 grains, Absolute Alcohol 60 minims, Tincture of Alkanet 1 in 5 Alcohol (90%) 10 minims, Castor Oil 4 ounces. The taste is covered: for children.

Castor Oil Solutions of Alkaloids.

Uses.—Instillation of Castor Oil to the eye allays the irritation caused there by foreign bodies. The alkaloidal bases (not their salts dissolved in Castor Oil are used in ophthalmic work. They keep well. A ℞ ℙ 2% solution of the combined bases Homatropine and

Cocaine have been of great service (*q.v.*). Solutions 1% respectively of [P] Atropine, Cocaine ([D] [P] 4% will dissolve), (P) Gelseminine, (P) Homatropine, [P] Hyoscine, [P] Hyoscyamine, and (P) Pilocarpine have also been used. Physostigmine (Eserine) is used in (P) ½% solution. R.O.H. has [P] 1%. Morphine is barely soluble in it to the extent of [D] [P] ½%. *In making these avoid excessive heating.*

Homatropine and Cocaine of each 2% in Oil is the most efficient cycloplegic.—N. Bishop Harman, B.M.J. i./20,599.

Corneal ulcers have been treated with **Oleum Scarlet et Atropinæ**, *q.v.*

Unguentum Olei Ricini Compositum L.H.

Zinc Oxide 1, Soft Paraffin 2, Hydrous Wool Fat 2, Castor Oil 3.

Sodium Ricinoleate. *Syn.* SORICIN.

The Sodium Salt of Ricinoleic Acid. A powerful detoxifying agent. Solution in water suitably flavoured is used as a mouth wash, and a **Sodium Ricinoleate** paste, 1 and White Vaseline 3 is used in dentistry.

The Ricinoleates prevent anaphylactic action to microbic toxins and increase immunity responses.

Sodium Ricinoleate 'Stearettes' contain 5 grains (0·3 Gm.) are preferable, owing to intense nausea when taken into the stomach. Good results have been obtained in colitis, eczema, and food asthma.

Detoxol Tooth Paste and **Detoxol Liquid** (used as spray, swab, or gargle) are essentially Sodium Ricinoleate.

PERIODONTAL DISEASES.—In 1921 Larson stated that pneumococci and streptococci would not grow in the presence of even small quantities of castor-oil soap, and that tetanus and diphtheritic toxins were found to be completely detoxified when sufficient castor-oil soap was added to reduce the surface tension below forty dynes. Sodium ricinoleate kills streptococcus on contact, neutralises its destructive ferment, and also renders harmless its toxins. The soap should be used both as a cleansing and as a detoxifying agent. By liberally applying it to the gingival crevice, and with a rotating motion of the brush, forcing it into the pockets, the bacteria crowded in the pyorrhea pockets are reached. A. S. Hopkins ("The Dental Cosmos," Aug., 1930) outlines a method of detoxification in the treatment of acute and chronic periodontal diseases by sodium ricinoleate 40%.—Per C. D.

Certain virulent strains of bacteria (*e.g.*, *B. tularense*, *B. pestis* and *Spirillum choleræ*) when immersed in solutions of Sodium Ricinoleate become avirulent. Further, certain bacterial suspensions clear on addition of small amounts.—L. ii./30,117.

ACUTE GINGIVITIS.—Trichloracetic Acid as a strong caustic leaves the gums in a weakened state and liable to further infection. Sodium Ricinoleate is better—probably acts by adsorption into the toxin molecule. Apply 33% of yellow variety, or 9% of white, to the dried sockets. Follow with hot Potassium Chlorate and Carbolic mouth wash.—J. Wheatley, Guys Hosp. Gaz., Jan. 13, '31; P.J. ii./31,227.

Sodii Sulphoricinas. *Syn.* TURKEY RED OIL.

$C_{17}H_{32}O.SO_3H.COONa = 400{\cdot}3146$.

Prepared by the action in the cold (not exceeding 50° C.) of sulphuric acid 1, on castor oil 3 (sulphurous acid must not be evolved), washing with plenty of water and nearly neutralising the product with soda.

Concentrated solution of Sodium Sulphoricinate will dissolve iodine, resorcinol and naphthalene, forming strongly antiseptic solutions.

It was employed as a Glycerin Substitute in the war.

Ⓟ **Phenol Sodio-Sulphoricinate.** A mixture of phenol 1, and Sodium Sulphoricinate 4. A thick syrup miscible with water. 20 to 50% solution for papilloma and tuberculosis of larynx and ozæna.

Pharyngo-keratosis (mycosis) has been treated with 10% solution, also 10% solution of Salicylic Acid in the sulphoricinate.

Magnesii Ricinoleas. *Syn.* **'Maricol.'**

Dose.—1 to 4 drachms (**4 to 15 Gm.**).

A white powder, employed in several proprietary preparations known as 'Castor Oil Powders.'

As much as 50% of Castor Oil can be incorporated in this way, but the compound is not a soap. The oil is for the most part free.

✱**Iodicin** (T.M. 376644). *Syn.* **Calcium Iodo-Ricinoleate.**—As an innocuous mode of giving Iodine without upsetting digestion, being absorbed from the bowel. **Capsules** 3 grains. In syphilis and ulcerated wounds used with advantage.

Ethyl Iodo-Ricinoleate. *Syn.* ✱ETHIDOL (T.M. 437469). *Dose.*—3 grains (**0·2 Gm.**) in capsules.

A preparation containing 20% combined Iodine and can be heated to 100° C. Stainless, non-irritating locally when used by inunction, almost colourless, and miscible with almond or olive oil.

Can be employed as injection in rheumatoid arthritis, tuberculous and scrofulous glands, and administered in epilepsy. Successful results have followed inunction in simple goitre and rheumatoid arthritis.—L. i./25,722.

OLEUM SANTALI.—*In numerous Pharmacopœias.*

With data on Copaiba and Cubebs.

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Santal or Sandal Wood Oil is distilled by steam under pressure from the wood of *Santalum album* (*Santalaceæ*), the yield being from 1 to 6%. A yellowish oil, with an aromatic odour and pungent taste. Contains not less than 2% of esters calculated as Santalyl Acetate and not less than 90% of free alcohols calculated as Santalol. (Some Pharmacopœias specify less.) Sp. Gr. 0·973 to 0·985.

It is now generally held that *Santalum album* is a root-parasite, and that in the absence of suitable host plants, it fails to succeed.

For further Characters, Tests and Notes on Manufacture, see Vol. II.

Soluble in alcohol 90%, also in ether and chloroform.

Flavoring.—Best given as Capsule.

Uses.—Internally in chronic bronchitis, *e.g.*, a few drops taken on a lump of sugar is found to relieve cough without expectoration. Is much employed in the treatment of gonorrhœa and gleet. It quickly checks the discharge in dose of 15 minims 3 times a day, and with the use of permanganate, zinc and silver nitrate injections gives good results; also in 10 minim capsules, for chronic cystitis, with benzoic and boric acids, as adjuvants.

Urinary infections due to the staphylococcus. The oil has an almost magical effect.—W. K. Irwin, B.M.J. ii./25,37.

Relative low toxicity of Sandal Wood Oil in comparison with phenol.—L. i./25,1198.

Australian Sandal Wood Oil is derived from *Fusanus Spicatus* and is largely used in Australia and other countries. This oil might replace the more expensive oil from *S. Album.*

Santalol. *Syn.* $C_{15}H_{24}O$.

Dose.—3 minims (**0·2 Cc.**) 6 to 12 times a day. The use of Santalol as distinct from its parent substance the oil has been advocated. Even in large doses there is no disturbing influence on the stomach or kidneys in gonorrhœa, cystitis, vesical and bronchial catarrh.

Santalol Capsules contain 5 minims (**0·3 Cc.**).

Santalol Formagules, 5 minims (*cf.* Formagules) are also made.

Santalol-Methyl-Salicyl Capsules contain 4 minims (**0·25 Cc.**) with 1 minim (**0·06 Cc.**) Methyl Salicylate. Used in gonorrhœa.

Santalyl Salicylate *Syn.* **Salicyl Santalol.**
$C_{15}H_{23}C_6H_4.OH.COO=340·2184$.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Manufacture.—We suggest heating Sodium Salicylate and Sodium-Santalol with Phosphorus Oxychloride. For a note on a patent since revoked, see Edn. XVIII, p. 623.

Yellow Oil with balsamic odour free from acrid taste. Stated not to irritate the stomach or kidneys ; given for urethritis and cystitis.

Capsules of Santal Oil are prepared, containing 5, 10, 15 and 20 minims in each. **Gonal Capsules** are similar.

✱**Savaresse's** (T.M. 11416) **Capsules** contain 10 minims, and are prepared with an animal membrane, which generally remains entire until they have passed the stomach.

Capsules of Santal Oil 5 and 10 minims **with Methylene Blue** ½, 1 and 2 grains are prepared.

Mistura Olei Santali. *Dose.*—One ounce (**30 Cc.**).

Oil of Sandalwood 4, Tragacanth, in powder 1. Mix and add quickly Water to 128. Shake well. Aromatic water with syrup may be used.

Mistura Santali Composita. *Syn.* NISBET'S SPECIFIC.

(This name may be used for the preparation without rendering it liable to stamp duty, providing the formula and this book and page are mentioned on the label.)

Dose.—½ to 1 drachm in water or milk thrice daily.

Santal Oil 12½ drachms, Cassia Oil 1½ drachms, Pimento Oil 40 minims, Alcohol (90%) 3½ ounces.

Capsules of Nisbet's Specific are prepared containing the Oils of ½ drachm dose of the above in 20-minim capsules.

Liquor Santali cum Buchu et Cubeba.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) well diluted.

Yellow Santal Wood in powder 4, Buchu in powder 1, Cubebs in powder 1, Alcohol (60%) *q.s.* to moisten. Macerate 2 days and percolate with more alcohol and press to obtain 20.

Liquor Santali Compositus.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted. Mix 2 volumes of Soluble Copaiba with 1 of the last preparation. A thick Liquor which can be almost cleared by adding 4% Potash Solution (1 in 2).

Copaiba, the Oleo-Resin. *Syn.* BALSAMUM COPAIVÆ. In numerous Pharmacopœias. *Dose.*—½ to 1 drachm (2 to 4 Cc.).

Obtained from the trunk of *Copaifera Lansdorfii* and other species (*Leguminosæ*), imported from the coast of South America.

Soluble almost completely 1 in 1 of Alcohol 90%, almost entirely in Absolute Alcohol, Ether, and in four times its volume of Petroleum Ether. That known as Para Copaiba is transparent, yellowish and thinner than the Maracaibo variety, which is brownish and somewhat fluorescent. Sp. Gr. about 0·975 to 0·995 (*B.P.*' 14).

Uses.—Diuretic and stimulant to mucous membranes, chiefly used for urethral diseases, and occasionally for chronic bronchitis. May produce a red rash. Given emulsified with mucilage or saponified, but best in Capsule. *See* also Liquor Copaibæ.

Capsules of Copaiba contain 5, 10, and 15 minims; capsules of **Capaiba and Santal Oil** of each 5 minims; also **Oil of Cubebs and Santal Oil** of each 5 minims; also **Copaiba and Cubeb Oil** of each 10 minims, and of each 5 minims.

Oleum Copaibæ (*B.P.*' 14).

Dose.—5 to 20 minims (0·3 to 1·2 Cc.). This is distilled from, and constitutes at least 45% of the oleo-resin. Sp. Gr. 0·896 to 0·910 Soluble in its own volume of Absolute Alcohol (distinguishes 'African'), about 1 in 20 Alcohol 90%.

Oil of Turpentine has been used as adulterant—it is recognisable in a distillate. 1 Cc. of the oil in 5 Cc. of glacial acetic acid, and 4 drops of nitric acid added, should not develop more than a faint violet colour (absence of Gurjun Oil).

Gonorrhœa treated by 15 minim doses at first thrice and then six times per diem with distinct effect on the discharge especially with the larger dosage. —R. Stockman, B.M.J. ii./15,128.

Haustus Copaibæ, St. Bart's. H. Copaiba 15 minims, Solution of Potash 5 minims, Spirit of Nitrous Ether 15 minims, Mucilage of Gum Acacia 60 minims, Camphor Water to 1 ounce.

Liquor Copaibæ, Soluble Copaiba.

Dose.—½ to 1 drachm well diluted.

Copaiba 18, Solution of Potash 26. Boil for 15 minutes, dilute whilst hot with 10 of water, transfer to a bottle and set aside to clarify; then syphon off the clear liquor from the supernatant oily portion and the sediment. Make volume of same 36 with water.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Mistura Copaibæ, St. M.'s H.

Copaiba 15 minims, Mucilage 1 drachm, Magnesium Sulphate ½ drachm, Cinnamon Water to 1 ounce.

Liquor Copaibæ cum Buchu et Cubeba.

Dose.—1 to 2 drachms (4 to 8 Cc.) well diluted.

Buchu in powder 5, Cubebs in powder 2, Alcohol (60%) *q.s.* Percolate and press to obtain 14. Mix 1 part with 2 of Soluble Copaiba.

Flavoring.—*See* Liquor Copaibæ.

[℗1] OPIUM.

Syn. **Humbergum, Tabaiaco. Succus Papaveris Somniferi Capsulæ Inspissatus.** (*The latter, contracted*—**Succ. Papav. Inspiss.**, *may be used in prescriptions.*) **Pulv. Succ. Papav.** *will denote Powdered Opium.* (9·5 to 10·5% *Morphine.*)

[℗1] '*Opium and all preparations or admixtures containing* 0·2 *or more per cent. of morphine.*' (*Altered January* 3, 1921).

[℗] *Medicinal Opium* '*of the requirements of the B.P.*' (*according to the* 1925 *D.D.A.* '*mixed or not mixed with neutral substances*'), *preparations and any substance containing one-fifth per cent.* (*one part in five hundred*) *or more of anhydrous morphine.* Raw Opium *includes powdered or granulated, but not medicinal, Opium.—See also Morphine and Diamorphine.*

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

Fr. Cx.—*Max. single dose* 3 grains ; max. during 24 hours 9 grains.

Antidotes.—*See* Morphine.

The inspissated juice obtained by incision of the capsules of *Papaver somniferum* (*Papaveraceæ*) from any geographical source. The Turkey product is best suited for pharmacy. Persian and Indian contain a large proportion of Narcotine.

Papaveris Capsulæ, Poppy Capsules. (*B.P.* '98.)

Ⓟ "*Poppies, all preparations of, excepting red poppy petals and syrup of red poppies* (*Papaver rhœas*)." *Note.*—Fleurs de Coquelicot in France = Poppy Petals.

In the dried condition the capsules are used to prepare.

Ⓟ **Decoctum Papaveris** 1 in 10. This is employed as fomentation in neuralgia, peri-dental abscesses and gum-boils.

Ⓟ **Decoctum Papaveris et Anthemidis.** Poppy Capsules 10, Chamomile Flowers 5, Water *q.s.*, boiled 10 minutes to produce 100. Employed as the last mentioned.

Poppy Extracts.—Extraction with ***Isopropyl Alcohol*** is suitable.—C. T. Bennett and D. C. Garratt, P.J. ii./26,149.

For galenical preparations, **Opium** *B.P.* '14 must contain when dried and powdered, between 9·5% and 10·5% of anhydrous morphine. Opium Fr. Cx. must contain 10 to 11% on the drug dried at 60° C. F.I. requires 10%. For the Tincture and Extract (*B.P.* '14), may be used if containing when dry not less than 7·5%, these preparations being standardised when prepared.

[℗] [℗1] Opium P. Jap. IV. assayed according to the directions works out as 10·12 to 11·12% Anhydrous Morphine. F.E. VIII, 9·5 to 10%.

[℗] [℗1] Opium. U.S. X. in its normal moist condition contains not less than 9·5% Anhydrous Morphine. **Granulated** and **Powdered Opium**, U.S. both contain 10 to 10·5% Anhydrous Morphine.

Opii Pulvis, P. Belg. IV., P. Ital. V. is 10%. These are official in addition to lump Opium.

For Assay Methods, see Vol. II.

It is difficult to understand why the U.S. specifies *P. Somniferum* and its variety *album* as it would be impossible to say whether either had been used.—E. M. Holmes, P.J. ii./16,485.

Investigations on Indian Opium. The terminal, or oldest, poppy capsules produce Opium of higher Morphine content than the lateral ones. Influence of manures. Indian Opium can be produced containing 20% Morphine, as rich, therefore, as Turkey Opium.—H. E. Annett, P.J. i./22,192.

A Comparison of International Preparations of Opium with special reference to the International Agreement of 1906.—H. B. Stevens, B.P. Conf., 1923 ; P.J. ii./23,110.

Tincture of Red Poppy Petals suggested for tinting medicines and foods. Keeps better than Syrup.—H. S. Redgrove, P.J. i./31,581.

Incompatible with Vegetable Astringents, Alkaline Carbonates, Salts of Mercury, Iron, Lead and Zinc.

Uses.—The oldest and most certain remedy for pain, also tends to check inflammation and relieve nervous diseases; lessens cough, arrests diarrhœa and dysentery (but is not advised for cholera). Externally the liniment is used for rheumatism, neuralgia and sciatica and is added to fomentations, and the ointment is applied to piles and fissures of the anus. Has some power in controlling the amount of sugar in diabetes. Children are very susceptible to its action.

It relieves the pain in appendicitis but must not be given for this, as, apart from the danger of the symptoms being masked, opium may paralyse the intestines and cause tympanites.

In CHOLERA even if a certain natural immunity exists it is immediately abolished directly the peristalsis is interfered with by Opium.

LOOSENESS OF BOWELS well treated by Laudanum. In colitis where tenesmus is distressing, and stools contain blood and mucus supplement dose by mouth by rectal injections (2 to 5 minims for a child) with a few grains of powdered Ipecacuanha in ½ oz. of thin boiled starch.

MELANCHOLIA—the mental pain of—treated by tonics, and in addition 5 minims of Laudanum thrice daily given without patient's knowledge, rapidly increasing until definite result.—B.M.J. i./11,804.

NERVOUS IRRITABILITY is quietened and gives a welcome spur to jaded nerves. For infants dose is ¼ minim of Laudanum for every three months of life. Can be repeated every 6 hours. With care no danger.

PERITONITIS from perforation of stomach or bowels. Where surgical treatment is undesirable Opium may be safely resorted to. In peritonitis there is marked tolerance to Opium even by infants.

In ACUTE PNEUMONIA its use may be attended with risk. In uræmic convulsions may be useful. To test truthfulness of statement of Morphine maniacs who have undertaken to cure themselves, the **Urine should be examined for Morphine.** At the end of 8 days from the beginning of abstinence the drug should have passed completely from the system.

PRURITUS VULVÆ in a severe case, 1 grain doses in pill was the only drug giving relief.—B.M.J. i./12,472.

SCIATICA.—Opium Extract ½ grain with Valerian in a mixture every 2 hours or Opium Extract ½ grain with or without Cocaine Hydrochloride ⅓ grain in suppository.

If the Opium Extract (½ grain) be combined with Belladonna Extract ⅓ grain in the suppository, constipation will be prevented.

SEDATIVE EFFECTS.—'STAGE FRIGHT' may be treated with 5 to 10 drops of Laudanum. Old refs.—Edn. XIX, p. 626.

Given as hypnotic and not to relieve pain. Opium should be taken 2 to 3 hours before bedtime.

ULCERATIVE STOMATITIS, common amongst ill-fed children, has been treated by 2 to 5 drops of Laudanum twice daily.

Abuse of Opium, Morphine, and Cocaine.

Opium Conferences under the League of Nations at Geneva.—Suppression of export trade in Opium for smoking takes effect within 15 years after the League is satisfied the smuggling has been effectively stopped. U.S.A. and China stood out.—B.M.J. i./25,321,419; P.J. i./25,200. The Convention of February, 1925, is not yet in force. Only the British Empire (excluding Canada and the Irish Free State), the Sudan, and Portugal, deposited their ratifications. A number of countries stand out. The position is highly unsatisfactory.—B.M.J. ii./26,1066.

China went back on her undertaking to extinguish Opium production within her borders and is raising thousands of tons of Opium yearly. Indian Government criticised for exporting large quantities.—B.M.J. ii./24,678.

The efforts of the Advisory Committee and the League of Nations have not been so successful as was originally hoped in combating illicit traffic in dangerous drugs.—B.M.J. i./27,804.

British Govt. Report for 1926 to the League of Nations on Opium and other Dangerous Drugs Traffic. A certain amount of smuggling.—B.M.J. ii./27,184.

Opium Consumption.—450 mgr. per head per annum might be considered a provisional maximum amount of Raw Opium (containing an average of 10% Morphine) for the medical and scientific requirements of countries possessing a well-developed Medical Service.—L. i./24,720.

Conference on Limitation of Manufacture (London, 1930). If each producing nation were allowed the quantity its manufacturers deem appropriate the total would greatly exceed the world's needs. League of Nations advised that 250 tons of Raw Opium and 6 tons Cocaine suffice for the world's requirements. Turkish statistics suggest that large quantities of Opium, Morphine, and Heroin pass from its factories into illicit channels—in the first 6 months of 1930 2,282 Kg. Morphine and 4,383 Kg. Heroin were exported (the last amount represents 40 times the amount consumed in Gt. Britain in a year). Russia considers production of Raw Opium and Coca leaf should be limited. Progress in suppression of use of narcotic drugs very slow—amazing that action on lines prescribed by our own Dangerous Drugs Acts has not been more widely adopted.—B.M.J. ii./30,535,572,1094 ; i./31,1125.

For reports of previous Conferences, see Edn. XVIII, pp. 627–8.

In Formosa an Opium smoker must have a licence from the Japanese Government. It is difficult if he reforms to induce the police to receive back the ticket.—G. Gushue-Taylor, B.M.J. ii./21,1010.

The drug addict is a product of modern civilization, and addiction is a symptom of a diseased mind ; he is often a psychopath first. Description of Opium smoking ; the Morphine in 10 pipes is only about ½ grain and 99% of this is destroyed in combustion. These addicts should not be regarded as criminals—they are mental cases. The HARRISON NARCOTIC LAW has proved a failure in the U.S.A. The legal cure in this country, on parallel lines, may be worse than the disease.—Prof. W. E. Dixon, B.M.J. i./23,544 (see also abstract under Cocaine).

Prof. Dixon's statements re Opium smoking strongly criticised. To say that the Opium smoker does not form a strong craving, and that he is easily cured, is simply not true. An Opium smoker passes through his cure with intense misery, especially manifesting itself in diarrhœa. The craving is intense.—J. Preston Maxwell, B.M.J. i./23,1076.

In the industrial centres of India there is a growing addiction to the use of 'Government Monopoly Opium,' the quantity consumed per 10,000 of population being 88 lbs. in Bombay, 216 lbs. in Rangoon, and 288 lbs. in Calcutta. Doping of children, by mothers working in cotton mills, unduly prevalent.—Review of the 'Opium Evil in India,' by C. F. Andrews, B.M.J. i./26,495.

INDIAN HEMP in India does not get the same hold on addicts as opium. There is much smuggling of Morphine by ships' crews. Morphine is abused by hundreds of thousands.—"Drug smuggling and taking in India and Burma."—Roy K. Anderson, B.M.J. ii./22,645.

Over £1,000,000 worth of drugs seized in New York during year ending June, 1923 ; most of it Heroin.—P.J. i./23,549.

The number of drug addicts in New York City was reported in 1918 to be 1·8% of the population.—P.J. i./26,543.

Opium smoking fast being ***replaced in China by Morphine injections*** and Morphine intoxication more frequent than ever before.—Per M.A., 1931,13.

Egypt.—Addicts increasing, total now 100,000. 500 Kg. Morphine derivatives introduced during the past 4 years through one channel alone. A Morphine preparation with habit-forming and narcotic powers made in Switzerland and not included by the list of drugs prohibited by Swiss Law.—T. W. Russell, Jl. A.M.A. ii./29,1742.

Opiate Addiction.—E. Huntington Williams' book on this subject (MacMillan, 1922). It is written from the American standpoint. It deals with the use of narcotics and their **"Withdrawal"** and **"Gradual Reduction."**

In treatment by withdrawal uneasiness and nervousness, followed by yawning, sneezing, watering of the eyes, excessive mucous secretion, extremities

becoming cold and clammy sweatings are relieved almost instantly by even a minute dose of the narcotic.

The object is to give a non-habit-forming drug, *e.g.*, Codeine or Ethyl-Morphine. Hyoscine or Atropine are given to 'groggy' effect limit.

In some patients, who are addicted to hypodermic medication, it is worth while changing the method of treatment to one *per os.*, but it should be noted that about 25% more of the medicament is required by this latter method. An important point is the giving of the same *quantities of solutions* either hypodermically or orally, the patient naturally associating a smaller quantity of diluent with an attenuated supply of drug.

Gradual Reduction Treatment in the U.S.A. lasts about two months :—

During the first 20 *days* the amount of Morphine hypodermically is decreased gradually, and the decrease made up either by giving the deficit, plus 25%, by the mouth, or by exactly replacing the amount of Morphine stopped with Codeine Sulphate. A gradually increasing dose of Strychnine, either with the injection or *per os* should be given.

The next 6 *to* 12 *days* should see the Codeine entirely replace the Morphine hypodermically, the Strychnine as previously, should be given and the Morphine *per os* should be gradually diminished, though, of course, the volumes of all solutions given must remain the same. The daily amount of Codeine must now be lessened, a period of about 10 to 20 days being occupied (according to the honesty and disposition of the patient) in reducing the amount to zero. During these last stages, a bitter tonic should be given and a daily dose of Hyoscine Hydrobromide of 1/50th of a grain is required.

Acidosis should be treated with Milk of Magnesia, and Cascara is useful for the frequently attendant constipation.

The Lambert-Towns Rapid Withdrawal Method is an extraordinary one, in which enormous quantities of Blue Pill are given, together with decreasing amounts of Morphine and increasing quantities of Belladonna, Xanthoxylum and Hyoscyamus Mixture. *v.* p. 220. The treatment appears to culminate in the administration of 2 ounces of Castor Oil, the nervousness of the patient being controlled with Codeine !

The Pettey Method (George E. Pettey) includes the administration of Scopolamine in 1/200th grain doses, Sparteine Sulphate in 2 grain doses and Sodium Thiosulphate in doses of 20 grains, every 2 hours for 24 hours. Cathartic capsules, containing Calomel, Cascara, Ipecacuanha, Strychnine and Atropine are also given.

In these more rapid methods Dionin is stated to be more efficacious than Codeine ; as it is about twice as powerful, it is argued that half the dosage will suffice. This is taken advantage of in

Sceleth's Method, in which Dionine ½ grain is combined with Scopolamine, Pilocarpine and Cascara, and an amount varying with the amount of Morphine taken is administered daily for 10 days. Then Strychnine 1/30th grain, three times a day for 1 day, and on the following day the dose is halved and continued for a week. In about 4% of the cases Scopolamine delirium has been observed. In such cases it should be omitted for a few doses.

Hyoscine and Pilocarpine constitute the bases of **Bishop's Method** with sometimes the addition of Heroin during the active stage.

For further on Drug Addiction, see Cocaine, Heroin, Morphine, Nicotine.

℗ **Emplastrum Opii** (*B.P.* 1898). 1 in 10 of Resin Plaster.

Fr. Cx., Opium Extract 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

℣ ℗ **Extractum Opii (Siccum)** (*B.P.* '14) is now powdered. P. Austr., Helv., Belg. IV., Hung., P.G. VI., Ph. Ned. V., P. Ital. V., F.E. VIII. Foreign Synonym—Extractum Tabaiaco (Thebaicum).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

An aqueous extract standardised to 20% of morphine.—F.I.adopts.

Fr. Cx. has the same with maximum single dose 1½ grains ; maximum in 24 hours 5 grains approximately.

[D] [P1] **P. Jap. IV.** has approx. 16·87 to 18·54% morphine.

[D] [P1] **Extractum Opii Liquidum** (*B.P.* '14).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Extract of Opium 0·75, Distilled Water 16, Alcohol (90%) 4. Is of same strength as Tincture of Opium (*B.P.* '98), containing 0·75% of morphine.

[D] [P1] * **Liquor Opii Sedativus.** (*Battley* T.M. 12765). *Dose.*—5 to 10 minim. (**0·3 to 0·6 Cc.**). A proprietary hypnotic and sedative. It contains 1·8% Morphine; 1 drachm contains 1 grain of Morphine.

Origin of and details of composition of a preparation intended to resemble the latter.—P.J. ii./14,136,213.

Ⓟ **Linctus Opiatus C. X.**

Liquid Extract of Opium 2 minims, Oxymel of Squill 20 minims, Dilute Sulphuric Acid 5 minims, Treacle 20 minims, Water to 1 drachm.

Ⓟ **Linctus Scillæ St. M.'s H.**

Oxymel of Squill ½ drachm, Compound Tincture of Camphor 15 minims, Honey to 1 drachm.

Ⓟ **Linctus Scillæ Opiatus.**—*Syn.* **Linctus Camphoræ Compositus St. Bart's., L. H., Gee's Cough Linctus, E.L., Linctus Scillæ Compositus E.G.A.**

Dose.—1 drachm (**3·5 Cc.**).

Paregoric, Oxymel of Squill, and Syrup of Tolu, equal parts.

Ⓟ **Linctus Tolutanus cum Opio.** **Brompton H.** uses Syrup of Squill *vice* Oxymel in latter.

[P1] **Linimentum Opii** (*B.P.*' 14). (*Exempted from* [D]).

Tincture of Opium 1, Liniment of Soap 1; filter after a few days. A commonly used anodyne for pain.

Ⓟ **Mistura Sodæ cum Opio, St. M.'s H.**

Liquid Extract of Opium 3 minims, dilute Hydrocyanic Acid 2 minims, Sodium Bicarbonate 6 grains, Water to 1 ounce.

[P1] **Pulvis Cretæ Aromaticus cum Opio** (*B.P.*'14). (*Exempted from* [D]).

Dose.—10 to 60 grains (**0·6 to 4 Gm.**).

Contains Opium 1 with 39 of Pulvis Cretæ Aromaticus, which has *dose* 10 to 60 grains (**0·6 to 4·0 Gm.**). The latter was the old "Aromatic Confection." Ⓟ Tablets each 5 grains (**0·3 Gm.**).

[D] [P1] **Pulvis Opii Compositus** (*B.P.* '14).

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Opium 10, Black Pepper 15, Ginger 30, Caraway Fruit 42, Tragacanth 3. Contains 1 of Opium in 10.

Note.—[D] [P1] *Pulvis Opii Compositus* Ph. Ned. V. is Dover's Powder (*B.P.* '14), and has Dover's Powder as Synonym.

[D] [P1] **Tablets** of Opium ½ and 1 grain.

Ⓟ **Tinctura Camphoræ Composita.**—*Syn.* PAREGORIC (*B.P.* '14). Is known on the Continent as **Tinctura Opii Benzoica.** *Syn.* FR. CX. 'ELIXIR PAREGORIQUE.' *Dose.*—½ to 1 drachm (**2 to 4 Cc.**) Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 3, and Alcohol (60%) to 1,000. F.I. requires 0·05% Morphine. *B.P.*'14 approximates this. FR. CX. has this strength.

Ⓟ P.G. VI., P. Belg. IV., F.E. VIII. and **Ph. Ned. V.** have 0·05% Morphine, but amounts of the other ingredients varied. Ⓟ **P. Jap.** has 1 of Opium in 200.

Tinct. Camph. Co. of the Portuguese Pharmacopœia is a liniment containing 20 times as much Opium as the British tincture.—C. Rousseau, B.P. Conf., 1923.

Flavoring.—Syl Coriandri, Glyl Pini; Elixir Aromaticus.

Ⓟ **Tinctura Opii Camphorata, U.S.**

Average dose.—1 drachm.

Similar in composition. 1 of Powdered Opium in 250.

Ⓟ **Syrupus Camphoræ Compositus, Bristol Infirmary** (revised).

Dose.—1 drachm (=laudanum ¾ minim approx.) occasionally.

Benzoic Acid 45 grains, Glacial Acetic Acid 7 drachms 20 minims, Vinegar of Squill and of Ipecacuanha each 10 ounces, Anise Oil 30 minims, Camphor 30 grains, Opium Tincture 2 ounces, 5 dr. 20 minims, Sugar 7 lbs., Caramel *q.s.*, Water to 1 gallon. Pharm. Form. advises at least 2½ ounces of Spirit to dissolve the oil, Camphor and Benzoic Acid. Mix the solution with the Laudanum and add to the cold syrup with stirring, then the colour.

℞ℙ **Tinctura Opii.**—*Syn.* Laudanum (*B.P.* '14). *Syn.* Tinctura Thebaica.

Dose.—20 to 30 minims (**1·2 to 2 Cc.**), or 5 to 15 minims (**0·3 to 1 Cc.**), repeated.

Contains 1% (*B.P.*'98 was 0·75%) of anhydrous Morphine.

℞ℙ **U.S. X.** has 1 of Granulated Opium (10 to 10·5% Anhydrous Morphine) in 10 of Alcohol and Water Mixture (Final Alcohol content 17 to 19% by volume). Fat in the opium is removed by hard Paraffin. The preparation replaces **Tinctura Opii Deodorati** of U.S. IX.—*cf.* Edn. XVIII, p. 632. **Ph. Ned., P. Hung., P. Belg. IV.,** and **P. Ital. V.,** contain 1% Morphine, made with 70% Alcohol. Fr. Cx. and F.E. VIII. dissolves 1 Gm. Opium Extract in 19 Gm. Alcohol 70% to produce the same strength.—*Maximum single dose* 35 minims, and during 24 hours 110 minims approximately. We found Sp. Gr. of this to be 0·902. F.I. requires 10% strength by percolation with Alcohol 70% and to contain 1% Morphine. *B.P.* '14 approximates this.

In support of the *B.P.* '14 method of making Tincture of Opium, and the *B.P.* '14 process of Opium assay—remarks on A. C. Abraham's and P. A. W. Self's papers.—D. B. Dott, P.J. ii./22,205. See also *ibid.*, pp. 128, 205, 231, 260. *For further remarks on estimation, see Vol. II.*

Flavoring.—Syl Menthæ Piperitæ, Syl Rosæ.

Uses.—*See* Opium.

℞ℙ **Tablets** = Tincture of Opium 5 and 10 minims are prepared, weighing 2½ and 4½ grains.

℞ℙ ✱ **Nepenthe** (T.M. 464) (or Anodyne Tincture) is similar and is given in dose as Tincture Opii (*B.P.* '14). Incompatible with alkalis. *It contains* 0·84% *Anhydrous Morphine.*

℞ℙ **Tinctura Opii Crocata.** Sydenham's Laudanum.

Dose. 5 to 20 minims (**0·3 to 1·2 Cc.**).

F.I. requires 1% Morphine. Fr. Cx. Supp. 1920.—Opium 110, Saffron 50, Cinnamon Oil 1, Clove Oil 1, Alcohol 30% 920—all by weight (conforms with F.I.). Max. single dose, 2 Gm. (=30 minims), max. during 24 hours 6 Gm. (=90 minims) approx. Other continental formulæ, *e.g.*, P.G. VI., F.E. VIII., P. Belg. IV., Ph. Ned. V. approximate this.

℞℗ **Vinum Opii Crocatum,** as used in Thieleman's Koleradraber (*q.v.*), in Norway, has the composition :—Opium Powder 15, Ceylon Cinnamon 1. Cloves 1, Saffron 5, Malaga Wine 150, *i.e.*, approximating the Tincture of P.G.

℗ **Tinctura Opii Ammoniata** (*B.P.* '14).—*Syn.* SCOTCH PAREGORIC.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Contains 0·1% Anhydrous Morphine. One ounce contains, quite approximately, ½ grain anhydrous morphine.

℗ **Trochisci Opii B.P.** 1885.

Contained $\frac{1}{10}$ grain Extract of Opium in each, with liquorice.

℗ **Trochisci Sedativi, T.H.,** contain the same quantity with fruit basis, and are marked ' S.'

℞ ℙ **Unguentum Opii.** 1 of extract in 10 of Unguentum Cetacei.

ℙ **Unguentum Gallæ cum Opio** (*B.P.* '14).

Contains 7·5% of Opium with Gall Ointment (Galls 1, Benzoated Lard 4). Exempted from ℞.

ℙ **Collapsible Tubes** with rectal tube are for use in hæmorrhoids. Prof. Dixon says opium locally has no effect.—B.M.J. ii./09,329.

℞ ℙ **Vinum Opii, B.P.** 1885.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Contained 1 of Extract in Sherry 20, with Aromatics.

℞ ℙ **Opium Concentratum, P.G. VI.**

Max. single dose.—0·03 Gm. ; *pro die* 0·1 Gm.

The total alkaloids of Opium as hydrochlorides, containing 48 to 50% Morphine. Elaborate instructions are given for preparation.

℞ ℙ **Hydrochlorates Alcaloideorum Principalium Opii, Ph. Ned. V.**

Syn. **Opialum, Opial.**

Dose.—Max. per os per diem 3 grains (**0·2 Gm.**) : *hypodermically* 2 grains (**0·12 Gm.**).

Contains Narceine Hydrochloride 1, Thebaine Hydrochloride 2, Codeine Hydrochloride 2·5, Papaverine Hydrochloride 4, Narcotine Hydrochloride 30, Morphine Hydrochloride 50, and Sodium Chloride 10·5%.

Sahli expressed the opinion that the ***combined alkaloids*** would be the most effective narcotic. The following are brands of the mixed Opium Alkaloidal Hydrochlorides in commerce.

℞ ℙ ✱ **Alopon** (T.M. 365294). *Dose*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) A light brown powder readily soluble in water. Gastric and intestinal sedative ; also in nervous conditions and in diseases of the respiratory tract. Used as an analgesic and hypnotic prior to operation as an adjunct to general anæsthesia.

℞ ℙ ✱ **Alopon Tablets,** Oral, 1/6 grain in each. *Dose.*—1 or 2 tablets, Hypodermic, 1/3 grain. *Solution,* 2 per cent for Oral use. *Single Dose.*—15 to 30 minims, repeated 5 to 15 minims. *Glass Capsules,* 1/3 grain in each, also 1/3 grain combined with Atropine 1/150 grain and 2/3 grain with 1/150 grain Scopolamine.

℞ ℙ ✱ **Omnopon** (T.M. 317126). *Syn.* PANTOPON—*Dose per os*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) thrice daily. *For max. dose cf. Ph. Ned. antea.*

1 Gm. of Omnopon is equivalent to 5 Gm. of 10% Opium.

Composition.—Morphine 52%, Narcotine 20%, Codeine 2%, Papaverine 2·5%, Thebaine 1%, Narceine 1·2%, other alkaloids 4%, Water 8%, Hydrochloric Acid 9%.—F. W. Watkin Thomas, Bio-Chem. Jl., *Vol. VI,* Part 4, 1912.

When used as an injection (Ampoules are made) 1 Cc. of 2% solution is injected 1 hour before operation, though the dose should preferably be subdivided and given at intervals, *e.g.*, ½ Cc. 1 hour prior to operation and another ½ Cc. just before, *i.e.*, as preliminary to Chloroform or Ether anæsthesia.

℞ ℙ **Tablets** of 1/6 grain Omnopon each = 5/6 grain Powdered Opium. For internal medication in suitable cases.

℞ ℙ **Ampoules** contain 1·1 Cc. of 2% solution in 25% Glycerin and Water = 25 minims Opium Tincture B.P. 1898. 1 Cc. = ⅓ grain Omnopon.

Phthisical cough, diarrhœa, dyspnœa of bronchial asthma, etc., are relieved, and in the first stage of labour.

Omnopon ⅔ grain **with Scopolamine** 1/150 grain is used as intra-muscular injection to subdue post operative pain.

For anæsthetic purposes intramuscular injection of 1 Cc. 1½ hours before operation, followed by a local anæsthetic is used to infiltrate the tissues in the operation area.

℞ ℙ ✱ **Opoidine.** (T.M. 419166). *Dose.*—Tablets contain 1/6 grain (0·01 Gm.). The total alkaloids of opium in a soluble form, one part being equivalent to 5 of opium. It contains about 50% Morphine. The Narcotine in the remainder is thought to 'potentiate' the Morphine (Straub). Hypnotic, sedative, analgesic and in other respects representing Opium.

Hypodermic Tablets and Ampoules contain ⅓ grain (0·02 Gm.).

There is less danger of toxic effects than from Opium, as smaller quantities can be given.—B.M.J. ii./25,804.

OVULES VAGINALES.

Oviform vaginal pessaries made with Glycogelatin or Theobroma Oil basis. They produce a continued action on the parts in leucorrhœa, also for ulceration and inflammation of the cervix uteri. Each Ovule weighs 4 drachms (15 Gm.). Medicaments :—

Alum, 10 grains (astringent).

Ⓟ **Belladonna Extract,** 1 grain (sedative).

Boric Acid, 15 grains (soothing).

Carbolic Acid, ½ grain (antiseptic).

℞ ℙ **Cocaine Hydrochloride,** ¼, ½ and 1 grain, and ℞ ℙ with Adrenalin $\frac{1}{500}$ grain.

Copper Oleate, 5 grains (in malignant disease).

Hamamelis, 10 minims of Liquid Extract (anti-hæmorrhagic).

Ichthosulphol 5, 10 and 12½% (30 grains in each) (in ulceration, antiseptic and stimulant), and Ⓟ with Belladonna Ext. 1 grain of Theobroma basis.

Iodine, 1 grain (astringent and antiseptic).

Iodoform, 5, 10 or 15 grains (antiseptic).

Ⓟ **Morphine Hydrochloride,** ¼ and ℞ ℙ ½ grain (anodyne).

Ⓟ **Opium,** 1, 2 grains (sedative).

Quinine Hydrochloride, 3 grains (in leucorrhœa and to check conception).

Resorcin, 3 grains (antiseptic).

Suprarenal Extract, 5 minims (hæmostatic).

Tannic Acid, 8 grains (astringent). Made with Theobroma basis.

To be efficient these ovules must be inserted as far as possible whilst the patient is in the supine position with the hips raised. A sanitary towel may be worn. Most effectual at bedtime.

Theobroma Ovule Mass for Hot Climates. Additions of Wax rais the M.pt. of Theobroma Oil. Our experiments using Theobroma Oi melting at 93° F. and White Wax melting at 142° F., show :—

With 2½% added gives M.pt. 90·5° F.; 4% and 5% added gives M.pt 91·5° F.; 10% added gives M.pt. 103° F.; 15% added gives M.pt. 115° F and 20% added gives M.pt. 122° F.

15% added is best—the resulting mass melts on the mucous membrane. See also **Suppositories.**

OXYGENIUM.

OXYGÈNE Fr. Cx. O = 16.

Oxygen is obtained commercially by the rectification of liquid ai by a process of fractional liquefaction. It is available so made o not less than 98·5% purity.

Liquid air as a source of Oxygen, *e.g.*, for aviators at high altitudes—can b obtained up to 80% pure.

It is sold compressed in **Cylinders** containing the equivalent o 20 cubic feet (560 litres approximately) for inhalation. It may b mixed with air at the time, or be passed direct into the patient' mouth by a glass tube or from a funnel above the face (the latte method is probably of little use—*vide infra.*)

Sp. Gr. 1·10527 (Air=1). 1 litre weighs 1·429 Gm. at 0° C. an 760° m.m. pressure. At 20° C. and under normal pressure 1 litre o water dissolves 28 Cc. of oxygen.

Ozone. O_3=48.

Is known as active or tri-atomic oxygen. It is a very powerful oxidising agent, the third atom of oxygen in the molecule being in the labile condition

The effect of passing electrical currents through oxygen is to produce ozone which may be recognised by the peculiar odour. When in large quantity i is irritating to the air passages, causing cough and headache. Mildly ozonise air has been inhaled for phthisis and the spasmodic stage of whooping cough

It has been suggested that inhalation of Ozone is injurious to the respirator tract rather than beneficial in warding off injurious diseases, but this i exaggerated. Experience in the Central London Railway and elsewher proves the contrary. There is no doubt that Ozone does not only mask bad smells but destroys them.—Ozonair Ltd.

Dysentery has been treated by Ozonised water and air.

Surgical use of Ozone. Sinuses healed.—G. Stoker, L. i./17,797.

Octozone.

A concentrated and potent form of Ozone, produced by passing Oxygen a a pressure of 5 lbs. through an electroniser in which it is subjected to a silen electrical discharge. True composition not yet definitely decided. It i soluble in water and stored in glass containers retains its properties for som days. Perishes red surgical rubber in less than 30 seconds. Too pungen to be inhaled, but may be used externally, in the form of a bath, or as loca application, or by intramuscular or rectal injection. Drinking it dissolved i water acts as gentle laxative. Has rapid action on wounds and ulcers, also i arthritis, neuritis, sciatica, etc.—O. Parkes and C. H. Buckley, L. ii./31,849

Uses of Oxygen.—

Warm the gas by discharging it into a rubber gas bag and keepin in same for an hour or two if possible prior to use. Open the cylinde in an adjoining room so as not to alarm the patient.

A **hot water box** may contain a spiral metal tube through which the Oxygen passes to the patient from the bag. **A Woulf's Bottl** containing hot water is also useful—the gas being bubbled through it

Inhalation of oxygen is of great service in pneumonia, bronchitis, asthma, angina; it relieves dyspnœa, and reduces temperature. May be used after chloroform to accelerate recovery. It is the best cardiac and respiratory stimulant. Severe cases of whooping cough have been treated—give just before onset if possible. In vomiting of phthisis it is said to have been effective. It has been used as an antidote to morphine, opium, strychnine, cyanide, nitrous oxide and carbon monoxide poisoning; for resuscitation after partial drowning.

Intranasal Method advised.—G. Bourne, Pr. Jan., '24,43.

In hæmorrhage, anæmia, etc., of doubtful use. Airs of more than 60% of Oxygen may produce pulmonary inflammation. Oxygen-enriched airs are of life-saving value in PULMONARY OBSTRUCTION, ŒDEMA, or other deficiencies retarding Oxygen absorption or preventing full saturation of the hæmoglobin of the pulmonary blood. Must be used with care.—C. W. Greene, Jl. A.M.A. ii./25,645—650.

In congenital heart disease oxygen is of no avail; not indicated by cyanosis of cardiac origin, when lungs are comparatively clear. Chronic cyanosis of emphysema is temporarily relieved. Specially called for in acute PULMONARY FAILURE, together with inadequate ability for compensation by the heart and blood. Should be administered over hours or days.—Per Jl. A.M.A. ii./25,1430.

Indications for Oxygen Therapy.—W. T. Richie, B.M.A., 1927, B.M.J. ii./27,915.

The Davies and Gilchrist Oxygen apparatus for the quantitative supply of Oxygen. Criteria of successful Oxygen administration are abolition of cyanosis, relief of dyspnœa, and—the most reliable—fall in pulse rate.—H. W. Davies, B.M.A., 1927, B.M.J. ii./27,911.

The British Submarine, "Poseidon," was rammed on June 9, 1931, off the coast of China by the Chinese steamer *Yuta*, and sank in 120 ft. of water. Two hours later 6 men equipped with the ***Davis Submarine-Escape Apparatus*** floated to the surface and were picked up alive by warships. Signals were received from 8 other men of 18 known to be entombed in the submarine, but efforts at rescue failed owing to heavy seas. The apparatus was invented by R. H. Davis, of Siebe, Gorman, Ltd. A tube is placed in the mouth, a clip fixed on the nose, motor-goggles over the eyes, and a sort of waistcoat slipped over the head. On opening the tap of a small cylinder attached to the waistcoat the latter expands like a balloon with Oxygen, the intake of which can be controlled. Lead weights are carried in a belt round the waist. The water pressure is equalised inside and outside the conning-tower, which is then opened, the weights are dropped and the man rushes up to the surface. The waistcoat contains sufficient Oxygen to last 45 minutes, and can be supplemented from the submarine's supply, enabling a trapped man to live and work for several hours.—"Daily Mail," June 11, 1931.

Leonard Hill's Oxygen Mask is of celluloid with a curtain of washable material and heating box for evaporating alcohol and adding vapour of alcohol to the oxygen. (The common idea that the processes of combustion in the body are accelerated by breathing oxygen is erroneous.)—B.M.J. i./12,71.

Haldane's Oxygen Apparatus for inhalation. Improved face piece and bag to attach to cylinder.—B.M.J. i./17,181; ii./19,65.

Pleurisy treated by injections of air.—B.M.J.E. ii./11,75.

A new outfit for administration.—L. i./25,916.

Oxygen and Alcohol Inhalation.—Sir W. H. Willcox advises as cardiac stimulant the use of Alcohol Vapour mixed with Oxygen. A wash-bottle is used, the Oxygen passing by the inlet tube in a rapid stream, dipping about half an inch or so below the surface of the contained Absolute Alcohol. At ordinary temperatures the Oxygen bubbled through the Alcohol would contain from 4 to 5% of Alcohol vapour (from 1 to 2 grains of Alcohol per litre). After from three to five minutes the full therapeutic effect is obtained, and lasts for several minutes. In severe cardiac failure the mixture of Oxygen and Alcohol vapour should be given for five minutes every half hour. The

Alcohol vapour is absorbed by the lungs and carried direct to the heart. Th method is pleasant and invigorating in pneumonia with cardiac failure, case of heart failure following Chloroform and various surgical operations, angin pectoris, asthma with cardiac failure, septicæmia, typhoid fever, myocardia degeneration, dilatation of the heart, valvular lesions of the heart, collaps after epidemic diarrhœa, etc.—B.M.J. ii./10,1408 to 1411 ; ii./10,1562,1658.

Carbon Dioxide in conjunction with Oxygen vide Carbon Dioxide.

Injection of Oxygen.

Endovenous injection of 120 Cc. of oxygen slowly in the case of a patient *in extremis* has been practised. Sciatica has been treated by the hypodermi injection (deeply) of 250—400 Cc. of Oxygen.

In the dyspnœa of tuberculosis, gas poisoning, pneumonia, bronchial asthma and operative cases oxygen has been *injected subcutaneously* until a lump th size of a closed fist is raised. The local emphysema is virtually an artificia lung lasting for hours ; results remarkable—the body absorbing that whicl is necessary. Injections might be a treatment for tetanus. The artificia oxygen emphysema is capable of rescuing men from incipient gangrene.— B.M.J. i./17,702.

In pneumonia, as a preventive of Chloroform or post-anæsthetic sickness and in extensive burns and scalds. If sufficient is given to inflate an area o skin equal in size to the palms of two hands the amount given is roughly 200 Cc. In bad cases give at least 400 Cc. and repeat in 6 hours if absorbed. The gas need not be heated or filtered, does not produce or aggravate lung trouble, or cause local or general bad effects. Inject below and outside the nipple or breast.—T. S. Kirk, B.M.J. ii./28,195.

Intraperitoneal injections. Of value in tubercular diarrhœa, tubercula peritonitis and ' tabes mesenterica.'—R. S. Grewal, I.M.G., Sept., '25,421.

For poisoning by asphyxiating gas subcutaneous injection of oxygen advised—*vide* Poisons at end under Chlorine.

Tuberculous affections treated by inflation with Oxygen. Fluid is firs aspirated from cavity.—E. Rost, B.M.J. ii./21,978.

Atmospheric Pollution.—Its causes and prevention.—See Vol. II

Liquid Air consists mainly of oxygen and nitrogen, and when freshly pre pared is a nearly colourless liquid boiling at —190° C. As the more volatile Nitrogen evaporates the temperature rises and the liquid assumes a bluish tinge—the colour of liquid oxygen. With the exception of oxygen and chlorine, which has a yellowish tinge, most gases are colourless in the liquid condition.

Uses.—Nævi have been treated with it.

For a description of Air liquefying apparatus, Vacuum Vessels, Thermos Flasks and Hydrogen liquefying apparatus, see Vol. II.

Nitrogen. N=14·008. Nitrogen is a colourless, odourless, tasteless gas constituting about 77% by weight (79% by volume) of the atmosphere. Nitrogen prepared from the atmosphere contains a small amount of **Argon** *q.v.* 1 litre of Nitrogen weighs 1·25072 Gm. at 0° C. and 760 mm. pressure. It is only slightly soluble in water. The Nitrogen group of elements includes Nitrogen, Phosphorus, Arsenic, Antimony, and Bismuth. These are in combination sometimes trivalent and at others pentavalent (Bismuth in its well characterised inorganic compounds is always trivalent—but in organic compounds also pentavalent).

The treatment of hæmoptysis in phthisis by **artificial Pneumothorax** consists in introducing Nitrogen between the two layers of the pleura through Saugman's or K. Peterson's needle (described), and thus inducing collapse of the lung. There is no chosen spot for the puncture—it is commonly made in one of the axillary lines in the seventh or eighth intercostal spaces. The aim is to find a spot where the lung is healthiest and to avoid the neighbourhood of cavities. A hypodermic injection of Morphine is desirable ½ hour before the operation. A local anæsthetic such as Eucaine is also advisable.

The quantity of Nitrogen or air injection is 200 to 300 Cc. Oxygen has also been suggested, but animal experiments were not in favour of its use.—L. ii./11,145 *et seq.*; ii./13,1627; B.M.J. i./14,897.

Pulmonary tuberculosis treated by Nitrogen Compression, three separate injections of 500 Cc.—G. Lucas, B.M.J. ii./15,211. See also L. ii./23,899.

Ordinary air used.—B.M.J.E. ii./26,15.

H. Batty Shaw recommends artificial pneumothorax in the early stages of consumption.—Pr., Feb., '24,107. *Further refs. previous Edns.*

Widespread impression that the treatment should be withheld until after trial of sanatorium methods, because of danger, to be deprecated. Of 394 cases only 2% died as the result of treatment.—R. C. Matson, L. i./25,790.

Some end-results in pneumothorax. Not a 'cure-all,' but nevertheless an advance in treatment.—S. V. Pearson, L. ii./25,1024; B.M.J. i./26,52.

Treatment of acute lobar pneumonia by artificial pneumothorax.—J. J. Coghlan, L. i./32,13.

Active Nitrogen.

The Hon. R. J. Strutt has shown that Nitrogen, under the influence of an electric discharge, assumes an active state in the same way possibly as Oxygen does in the form of Ozone. This active Nitrogen is reactive with Carbon Compounds.—L. i./13,1469.

PANCREAS.

The pancreatic juice of man contains several digestive ferments :—

Trypsin, a proteolytic ferment acting in an alkaline medium. Converts protein, albumen, *e.g.*, casein of milk and fibrin, into peptones; **Amylase (Amylopsin) or Pancreatic Diastase** which converts starch into dextrin, maltose and dextrose; **Lipase (Steapsin)**, a lipolytic ferment (emulsifies fats), see also p. 755; and a **Milk-curdling Ferment Rennin,** converting casein into a form of peptone.

The idea that Rennin is present in the Pancreatic Juice is not held by many (vide Bainbridge and Menzies, 'Essentials of Physiology') who consider that Trypsin is the milk-curdling function. The presence of Rennin would seem to be unnecessary in view of the active milk-curdling property of the gastric juice.

For invalids, aged persons, and those suffering from weak digestion, or those prostrated by fever or exhaustion, preparations of the pancreas of the pig (an omnivorous animal) may be employed, by means of which food may be partially or wholly digested previous to administration; their nutrition is thus maintained, and the stomach has time to regain its powers of digestion.

The pancreas is sometimes called the 'sweetbread,' but the sweetbread known to cookery is the thymus gland of the sheep.

The pancreas plays an important part in enabling the organism to resist infection, and the spleen is said to assist by producing a hormone which activates trypsinogen and raises the phagocytic index.

Mechanism of the pancreatic secretion.—J. Mellanby, L. ii./26,215.

Diet in gout.—Pancreas and Thymus Sweetbreads are the foods richest in purins. They are frequently advised for invalids' diet. It would appear desirable to eliminate these foods.—L. i./13,1793.

SPRUE.—Raw pancreas—initial dose a teaspoonful, increased to a tablespoonful of chopped mass, including juice, once or twice daily, useful adjuvant. —A. Castellani, Jl. Trop. Med., June 15, '25,231.

HIGH BLOOD PRESSURE treated by a Pancreatic Extract intramuscularly. —B.M.J.E. i./31,121.

Chemical tests of pancreatic efficiency.—Carbohydrate, Protein-splitting, Fat-splitting, etc.—G. A. Harrison, L. i./30,1249,1305.

Pancreatinum, U.S. X.

Dose.—2 to 4 grains (0·12 to 0·25 Gm.).

A cream-coloured amorphous powder, slowly and incompletely soluble in water; insoluble in alcohol; consisting principally of amylase, trypsin and lipase, obtained usually from the hog. It digests albuminoids and converts, if of U.S. Standard, not less than 25 times its weight of starch into soluble carbohydrate. Assay process is provided.

Fr. Cx. states it loses its activity on warming solutions of it above 50° C. Its peptonising action is best in neutral or very slightly alkaline or very slightly acid solution. The Assay process provides for conversion of 12½ times its weight of dried fibrin or 50 times its weight of fresh fibrin.

Pancreatin Tablets, 2½ grains with Sodium Bicarbonate, are prepared One is sufficient to peptonise half a pint of milk.

Liquor Pancreatis, Pancreatic Solution (*B.P.* '14).

Dose.—1 to 2 drachms (4 to 8 Cc.).

Contains amylolytic, the proteolytic, and the milk peptonising properties of the pancreas. Made by extraction of the fresh pancreas of the pig, freed from fat and external membrane.

Pancreatic Juice, obtained in its inactive form from the pancreatic duct, acquires powerful proteolytic activity by mixing with it a soluble calcium salt and incubation.

Test.—Should peptonise 27 times its volume of milk.

Incompatibility.—Acids and compounds with acid reaction destroy the proteolytic power. For details of inhibition of Amylolytic Activity, *see Vol. II., cf. also* **Pepsin.**

Uses and References.

Glycosuria.—In certain forms of severe glycosuria depending on excessive activity of the liver Pancreatic preparations are valuable.

Pancreatic juice is the digestive fluid *par excellence.* Many animals are void of a gastric digestion, but all have something corresponding to pancreatic juice. Dextrose, as far as experiments go, is the best tissue food. The internal secretion of the pancreas determines its utilisation by the organism.

Insulin *is dealt with at end of this chapter.*

In chronic pancreatitis, pancreatin in suitable intestinal medicament may be employed with advantage before the operation and also in cases unsuitable for operations.—Whitla.

It should be given as digestive *towards the end of the normal period of gastric digestions—about two or three hours after a meal.*

In Sprue, pancreatin in 5 to 10 Gm. doses with 20 to 40 Gm. Calcium Carbonate, three times a day 2 hours after food, has been given with success. The treatment is based on results of experiments, which showed complete absence of pancreatic ferment.—T. D. B. 18/21,50.

Glycerinum Pancreatis, *Martindale,* a digestive preparation made from the pig's fresh pancreas.

Dose.—1 to 2 drachms (4 to 8 Cc.).

Liquor Pancreaticus (✱Benger's: T.M. 321220).

Dose.—1 to 2 drachms (4 to 8 Cc.) in water with meals to aid intestinal digestion, or with farinaceous gruel, when cool enough to sip. As an addition to nutritive enemata, a dessertspoonful should be

added to beef tea or milk-gruel just before its administration. Will not keep diluted, and presence of acidity or heating over 140° F. destroys the ferment.

N.F. gives the following :—Triturate Pancreatin 128 grains, with Sodium Bicarbonate 6 drachms, and Water 10 ounces, add Alcohol ½ ounce, Compound Spirit of Cardamom N.F. ½ ounce, and Talc 120 grains. Shake well and filter, adding Water to 12 ounces, then Glycerin 4 ounces. Each drachm represents 1 grain of Pancreatin.

Spiritus Cardamomi Compositus. Compound Spirit of Cardamom, N.F. Dissolve Oils of Cardamom 4, Caraway 1·5, Cinnamon 1, in Alcohol (U.S.) 1,000, add Glycerin 130 and finally Water to 2,000.

Peptonised Milk (*v. also* Peptonising Powders, *infra*).

Mix two-thirds of a pint of fresh milk with one-third of a pint of water, and warm in a saucepan to a temperature of about 140° F. (or the diluted milk may be divided into two equal portions, one of which may be heated to the boiling point and then added to the cold portion, the mixture will then be of the required temperature). Add two teaspoonsful of Liquor Pancreatis, and half a level teaspoonful of sodium bicarbonate. Pour the mixture into a covered jug and place in a warm situation for ten to twenty minutes, then boil the product. It can then be used like ordinary milk. **Gruel** can be similarly treated. *See also* Enemata and Peptonoids of Beef.

In the place of the water half a pint of lime water may be used to the pint of milk. The preparation if desired for early use may be kept at 15° C. for three or four hours; need not necessarily be boiled.

Peptonised Beef Jelly and **Chicken Jelly** (✱Benger).

As a restorative, either may be taken alone by teaspoonsful, or dissolve two or three teaspoonsful in a teacupful of boiling water (with pepper and salt). Enriches beef tea, soups, broths, etc. They are readily assimilated by weak digestions. Containing much of the flesh-forming elements of the meat in soluble form these peptonised preparations are superior to non-peptonised extracts.

Peptonising Powders.

Pancreatic enzymes mixed with sodium bicarbonate, in glass tubes. Place the powder into a clean quart bottle with ¼ pint of cool water, add a pint of fresh milk, and shake. Place the bottle in warm water for *ten minutes*, then pour the milk into a saucepan and heat quickly to boiling and allow to cool sufficiently for use. If desired, smaller proportional quantities may be utilised.

Uses.—In gastric ulcer, intestinal catarrh, for infants' use generally—and in all forms of weakened digestive functions.

Peptonising Powder for humanising Milk. *Martindale.*

To peptonise milk and simultaneously to increase the Lactose content, Lactose 400 grains containing a small proportion of Pancreatin and Sodium Bicarbonate may be added to ½ pint each of milk and cold water mixed and three to four tablespoonsful of cream. Allow to stand at about 40° C. for about 15 minutes and boil or heat the mixture in such a manner that it shall take ten minutes to reach the boiling point. Milk so treated must be kept in a cool place. To be slightly warmed again on feeding. In some instances a further dilution, *e.g.*, milk 1 to water 2 may be necessary. The result very closely approximates 6·3% Lactose, *i.e.*, the usual content in human milk.

Tablets of Pancreatin 5 grains, **Sodium Bicarbonate** 3 grains, and **Bile Salts** 2 grains. *Dose.*—1 or 2 crushed in water at the conclusion of a meal are prepared for use as an intestinal antiseptic and digestive, and may prevent formation of gallstones.

Trypsin. *Dose.*—8 to 20 grains (**0·5 to 1·2 Gm,**).

Trypsin is stated to be produced simultaneously with Amylopsin, and from the same cells in the pancreas. This ferment is prepared commercially in the form of whitish powder, possessing an odour like pepsin. It changes proteins into peptones in alkaline media. It is inactive at 75° C. One part should peptonise about 100 of coagulated egg albumen in 1½ hours.

Soluble slightly in water, more so in glycerin.

It is administered to assist digestion in diabetes, and it is occasionally employed for peptonising milk.

Stearettes of Trypsin, containing 5 grains are useful as passing intact through the stomach.

Method of preparation of an active **Sterile Glycerin extract.** Effective in prevention of peritoneal and pericardial adhesions.—R. P. Walton, Jl. Pharm. and Exp. Therap., Dec., '30,403.

For Muller's Trypsin Test for determining the activity of Trypsin Preparations, see Vol. II.

INSULIN.

Dose.—Commence with 5 units twice a day—half an hour before breakfast and supper respectively. Most of the food should be taken in these two meals. If after three days of this dosage glycosuria still persists the dose must be raised gradually, first to 10 and 10, and later 15 units or more, if required. On the 7th day test every two hours to get a further idea of the effect. By the 11th day all Sugar and Acetone may have disappeared from the urine and the blood picture may have become normal. This may represent the permanent balance of diet and Insulin, but more often the patient's pancreas improves so that the 13th day 15 and 10 units are too much—12 and 8 units may suffice. Patient's tolerance may continue further, and still less Insulin may be needed.

Diet reached must be strictly adhered to. It is well to add 5 Gm. of Carbohydrate and 20 Gm. of fat. This gives 200 calories without ketosis. If well borne, raise to 600 calories. On further increase little protein should be included—8 Gm. with 10 Gm. of fat. About *4 units of Insulin are required for each addition to the diet of 5 Gm. of Carbohydrate and 20 Gm. of fat.*—' The Diabetic Life,' R. D. Lawrence, 1930.

In consequence of **revision of Carbohydrate content** of foodstuffs—old figures being erroneous—double the amount of numerous vegetables, *e.g.*, cabbage, spinach, cucumber and tomatoes can be allowed and lettuce, asparagus and rhubarb contain so little, they can be allowed as extras.—R. D. Lawrence and R. A. McCance, B.M.J. ii./29, 241.

Technique of Injection.—Insulin is given subcutaneously (it may be given intravenously in coma), the skin having been previously sterilised. Wherever possible, patients should always be taught to give their own injections, the best sites being the front of the thighs, the abdomen and the lower part of the chest. Before breakfast the abdomen is a good site, and during the day the thigh in women and the skin below the knee in men are the most convenient. Pain is minimised by using a fine sharp needle and inserting at right angles to the skin. To avoid local fatty atrophy the site of injections is changed every week or 10 days and no two punctures should be made in exactly the same spot within 24 to 48 hours.

Treatment of coma.—Treat as for collapse, clear bowels with enema, or wash out stomach, and give as much fluid as possible either *per os* or intravenously, with Sodium Bicarbonate in 2-drachm doses 2-hourly to combat acidosis. Give immediately 40 units of Insulin subcutaneously or intravenously with 40 Gm. of Glucose by mouth, stomach, or rectum, or intravenously in 20% solution, and repeat procedure every two hours with half initial dose of Insulin and Glucose till consciousness returns, with larger doses after 10 hours if no improvement shows. When consciousness returns reduce Insulin to 10—15 units and Glucose to 10—20 Gm. 4-hourly.

Manufacture.—

Brit. Patent, No. 203,778. *Complete Specification accepted* Sept. 13th, 1923. 'A METHOD OF PREPARING EXTRACTS OF PANCREAS, SUITABLE FOR ADMINISTRATION TO THE HUMAN SUBJECT.' By F. G. Banting, J. B. Collip and C. H. Best, British subjects, all of Toronto University, took out the Patent in the name of the University. The British rights were offered to the M.R.C. and accepted.

The following is an abstract:—A pancreas extract containing the anti-diabetic principle or hormone. It is essential for intravenous or subcutaneous administration that the anti-diabetic principle be purified from the enzymes, proteins, lipoids and salts. Self-digestion (proposed by earlier workers) would allow the enzymes to destroy the active hormone. In this new invention Alcohol is used, which inhibits deleterious action of the enzymes on the hormone; proteins, salts and other substances are removed, as far as possible, from the solution by precipitation. An *improved* method is also mentioned in the specification, which consists in finely dividing (mincing) the pancreas and mixing it with Alcohol; straining or filtering the mixture to separate inert gland tissue; treating the filtrate with several volumes of Alcohol; removing the precipitate by filtration and concentrating the filtrate; treating the latter with Ether; eliminating the Ether; adding Alcohol; centrifugalising the mixture to form into layers, so that the uppermost one consists of Alcohol holding the hormone in solution, the lower layer or layers consisting of flocculent protein, salt solution, and salt crystals; subsequently removing the uppermost layer and treating it with several volumes of 95% Alcohol, separating by precipitation any substances which may still be present with the hormone; then distilling off the Alcohol, dissolving the hormone in distilled water and concentrating the aqueous solution, sterilising it and adding 0·5% Trikresol.

In the **Picrate Method** of purification used in Gt. Britain (Brit. Pat. 216,978, M.R.C. and H. W. Dudley) a saturated Picric Acid solution (½ vol.) is added to a 1 to 1·5% crude Insulin solution in water. The Insulin Picrate is washed, converted into Hydrochloride (by dissolving in N/1 HCl in 75% Alcohol), and finally precipitated with Acetone. The purified Insulin is about 6 times the strength of the crude. For medicinal use dissolve in isotonic salt solution with Hydrochloric Acid, adjusting acidity to pH 3·5 and adding 0·1% Tricresol.

Destruction of the Insulin by digestive ferments prior to preparation obviated by freezing the pancreas immediately after removal.—C.D. i./27,271.

The theory of *hyperglycæmia* is given in the first patent. Prior to its conversion into glycogen, or its oxidation, glucose (normally) probably becomes altered so as to be more reactive. In diabetes, the sugar absorbed from the intestine is no longer changed into an active form, therefore it cannot be stored in the liver as glycogen, nor oxidised in the tissues—hence the hyperglycæmia and the glycosuria.

The relation of the pancreas and diabetes was established by the experiments of Von Mering and Minkowski; extirpation of the pancreas in dogs was followed by persistent glycosuria. The pancreas consists of two types of tissue—the *acinar*, secreting the

pancreatic juice (*external* secretion), which reaches the intestine through the pancreatic duct, and groups of cells, known as the '**Islands of Langerhans.**' The latter show pathological changes in varying degree, in most cases dying of diabetes mellitus. Numerous workers believed that this insular portion provided an *internal* secretion, needed to normal carbohydrate metabolism and they tried to produce extracts of it for treatment, but these extracts contained toxic substances, which resulted in their causing local irritation, and they were clinically unsuited.

The Islands of Langerhans were proved to contain a substance which lowers the blood sugar, and diminishes or abolishes excretion of sugar in the urine of diabetic dogs. Subsequently, by extracting fœtal or adult normal pancreas with Alcohol, they made an extract which caused a lowering of blood sugar, and the glucose in the urine when injected into a boy suffering from the disease. The Alcohol evidently prevented the destruction of the principle by the digestive ferments.

In short, "it has been proved, for the first time in the history of medical science, that a product can be made from pancreatic glands of mammalia, which will save and has saved the lives of a number of diabetic patients, many in a state of coma before the substance was given."

On injection, it converts glucose into the active form, and if given at proper intervals blood sugar is maintained at normal level and the urine remains free of sugar. Fat is completely oxidised. Acetone bodies disappear from the urine and diabetic acidosis and coma are prevented—a restoration to normal metabolism.

It is also patented in U.S.A., Canada and other countries.

Eulogy of the work of Banting and Best.—Lord Moynihan, L. ii./30,785.

A paper entitled 'Insulin and its Manufacture,' read before Roy. Soc. Arts., Feb. 23,27 (Abst. C.D. i./27,263) by F. H. Carr and H. H. Dale, provides details.

British Insulin and **Lilly's Insulin** are prepared from *ox* pancreas.

* **'A.B.' Insulin** (T.M. 434638).

* **Lilly** (T.M. 150173, 320305, B.442141 & 2).

Danish Leo Insulin is made from pigs' pancreas, and contains no preservative.—*See Preservatives postea.*

The **Therapeutic Substances** 1925 and Regulations 1927 control Manufacture under Licence, Standard, Quality, containers, etc. Further Regulations, Part III., Sec. 9 (2), Aug. 1, '31 provide for addition of preservative to preparations like Insulin, sealed in containers, to be tapped from time to time.—L. i./31,1422.

For the population as a whole the use of Insulin has shown its value in reduction in deaths from diabetes during early and middle life, but *the general use* of Insulin throughout the country has been advancing only gradually and is below the level of maximum need.—'National Supply of Insulin,' M.R.C. Rept., 1929-30.

Chemical Composition probably $C_{69}H_{102}O_{22}N_{18}S$, a sulphur containing compound composed of amino acids.—B.M.J. i./26,839. Another

formula :—$C_{45}H_{69}O_{14}N_{11}S.3H_2O$, but the actual formula may be a multiple of this.—Pres., Dec., '27,420.

It is rapidly destroyed by Trypsin, also Pepsin. This throws light on the fact that Insulin has very little, if any, effect when given *per os*. It is stable to heat when its solution is strongly acid. It survives heating to 100° C. for half an hour. It does not approach the chemical simplicity of Adrenalin or even Thyroxin.

Commercial Insulin is composed of ***at least three substances,*** the true pancreatic hormone A, the anti-Insulin B, and co-Insulin C. A and B have been obtained in crystalline form.—C. Funk, L. ii./26,1244. Further details—Edn. XIX, p. 642.

Insulin appears to be as intangible as the Vitamins and enzymes. It can be inactivated by Hydrochloric Acid and Ethyl Alcohol and activity restored by Sodium Hydroxide.—Prof. J. R. Macleod, L. ii./30,518.

Distribution in Nature. In higher animals it seems to be strictly limited to the islets of Langerhans in the pancreas. It is to be found also in certain fish. There is evidence also of the presence of something allied in yeast.—H. H. Dale, L. i./23,989.

Insulin is present in potatoes, rice, beetroot and celery. A substance having an Insulin-like action in reducing blood sugar has also been extracted from the kidney, spleen and muscle tissue of dogs and cattle.—C. H. Best and D. A. Scott, Jl. Metab. Research, Jan., 1923, per Pres., May, '24,220.

Clams yielded Insulin. Collip suggested it must be present wherever Glycogen is found. Later he made it from yeast, confirming Winter and Smith, but this type differs, in that its action in lowering blood sugar is delayed sometimes for a day or two. The same applies to Insulin-like substances from various vegetable sources styled *Glucokinin*.—Prof. Macleod, B.M.J. ii./23,165.

Insulin isolated from *yeast*. An extract of yeast has an effect similar to Insulin when tested on animals and diabetics.—Winter and Smith, B.M.J. i./23,711,819.

Insulin may be obtained from the islet tissues of the cod, the yield, even under unfavourable conditions, being 13 rabbit units per Gm., and the tissue probably contains about 10 times as much, weight for weight, as mammalian tissue.—Biochem. Jl., 18/24,665.

Preparation by Aqueous Extraction.

From an extract of the pancreas made with aqueous Formic Acid at — 3° C., proteins and Insulin are precipitated as picrates. The latter is extracted by Acetone and is isolated on dilution with water. Alcoholic Acid converts this to the hydrochloride, which, although more cheaply and quickly prepared, appears as satisfactorily clinically as Insulin obtained by the Alcohol method. Average yield 300 rabbit units per kilo of pancreas.—E. C. Dodds and F. Dickens, L. i./24,330.

By adding 5% of Paraldehyde to the extracting fluid the yield was increased to 535 rabbit units ; by distilling off the Acetone this was again increased to 1,040 units, and finally by eliminating the preliminary aqueous extraction and preparing the picrates simply by grinding the pancreas with solid Picric Acid a yield of 1,845 units was obtained—the highest recorded yield. The time of the complete process is reduced by this method to about one day.—E. C. Dodds and F. Dickens, Brit. Jl. Exper. Path., April, '24, per L. i./24,909.

Recommended that Insulin be precipitated from aqueous solution by Ammonia Sulphate (half saturated), allowed to stand for 24 hours, centrifugalised, and the supernatant fluid drawn off. The precipitate containing Insulin is dissolved in 70% Alcohol, concentrated to 1/10th its volume and added to 94% Alcohol, by which Insulin is again precipitated. 'Impure' Insulin causes delay in blood coagulation, and a case is recorded where its employment prior to operation resulted in profuse hæmorrhage, due to anti-thrombitic action produced.—B.M.J.E. ii./24,52.

Crystalline Insulin.

Preparation.—A rich fraction of Insulin is dissolved in Acetic Acid and precipitated by a Brucine solution. The clear liquid containing the Insulin is separated and treated with Pyridine with which a crystalline precipitate is formed. This is redissolved in Acetic Acid and again precipitated with

Pyridine. The crystals melt at 233°, and in a dose of 0·01 mg. causes hypoglycæmic convulsions in rabbits.—J. J. Abel, Johns Hopkins Univ., per Pres Dec., '26,426. *See also* Jl. Ph. and Exp. Ther., May, '27,65.

Crystalline Insulin from Cod Fish and Pollock identical in physiologica activity and Sulphur content with beef Insulin.—H. Jensen and co-worker Jl. Ph. and Exp. Ther., May, '29,128.

Tablets of Insulin Hydrochloride each equivalent to 10 unit are prepared. To be dissolved in 0·5 Cc. of sterile distilled water.

Preservation.—0·3% of Cresol is added to preparations.

Doubtful if antiseptic desirable.—O. Leyton and E. P. Poulton, L. i./31,996 T. Izod Bennett, *ibid*, 1053. Compulsory addition injurious.—F. Sandon *ibid*, 1422.

Solutions with pH 3—4 are themselves germicidal, but a slight increase c alkalinity destroys germicidal action and actually converts it into a cultur medium if no preservative is present, but the presence of the usual proportio of Phenol suffices to keep it germicidal.—P. Hartley, L. ii./31,584. Insuli and Preservatives.—Pres., Dec., '31,406.

Units.—A unit was originally taken as the amount of Insuli which on subcutaneous injection can lower the percentage of bloo sugar to 0·045 within four hours in a rabbit weighing about 2 kg, from which food has been withheld for sixteen to twenty-four hours Such Insulin was first prepared so that 1 Cc. contains one unit

Subsequently the U.S.A. makers brought in a unit with approximately *one third* of the Toronto unit, and the Medical Research Council adopted the U.S.A. unit—*i.e.*, *three* units, as at presen defined, produce this reduction in blood sugar (to 0·04%) with standard conditions (in 2 hours). The average single dose for an adul is 10 New Style units, *i.e.*, 3 to 4 times the quantity for the rabbit Think in units rather than so-called ' doses.'—M.R.C., B.M.J. i./23 737. See also Prof. H. Maclean, L. i./23,1044.

As a result of an International Conference, held under the auspices of the ***Health Committee*** of the ***League of Nations,*** to discuss the question of biological standards, Great Britain has assumed the responsibility for Insulin, and the National Institute accepted the duty of preparing and keeping the ***International standard*** of reference. Simultaneous determinations made by the National Institute (on material made by that Institute), the Insulin Committee of the University of Toronto, and three other laboratories in the U.S.A. and in this country, varied only between 8·4 and 8·8 units per mg. of the dried preparation, and the International Conference therefore accepted the recommendation of the Toronto Committee that this preparation, preserved at the National Institute, should be the International Standard for Inulin, and 1 mg. thereof should be taken to contain 8 units of Insulin.—B.M.J. is./26,251.

✱' **A.B.' Insulin** (T.M. 434638) the first British Insulin produced —is free from toxic effects and ***each clinical unit*** contains ***0·00005 Gm. Insulin Hydrochloride,*** its activity being adjusted to the International Standard.

A solution containing 1·8% Sodium Chloride and N/1000 Sodium Hydrate mixed with equal parts of a commercial brand of Insulin, renders injection painless.—O. Leyton, L. i./24,1082.

Suitability of the Case.—The patentees point out that the indiscriminate use of their product is a source of danger. All cases, except those suffering from severe acidosis and coma should be put to bed and given a basal maintenance diet—protein, in sufficient quantity, to replace the daily wear on the tissues, approximately 0·3 Gm. per lb. body weight. Additional calories in food

are supplied by carbohydrates and fat in proper proportion to prevent production of acetone bodies. If the urine of patient becomes sugar free on this, it should be gradually raised to an adequate diet for his ordinary duties. If he remains aglycosuric the treatment with Insulin is not indicated. 75% of diabetics can be controlled by diet. If at the end of the week's treatment on basal diet, the urine is not free of sugar, the patient requires Insulin.

There is no evidence as yet that the treatment is curative. It is not recommended unless the treatment can be continued. The initial stages of treatment should be carried out in connection with facilities for blood and urine sugar estimations.

In 1922 the average life of a diabetic was 6 *years*; to-day patients who started treatment with Insulin on its introduction 9 *years ago* are still alive and a growing percentage outlive their life expectancy. —E. P. Joslin, Jl. A.M.A. ii./31,595.

Contraindication.—It is dangerous in cases of so-called 'renal glycosuria' or **diabetes innocens,** in which the kidney fails to hold back the normal amount of glucose in the blood, *i.e.*, the patient is already in a condition of persistent hypo-glycæmia.

Hypoglycæmia: Effects of excessive dose.—There is a rapid fall of blood sugar following a single injection. This blood sugar content reaches a low point in 2 to 8 hours, and tends to return to the original level in 12 to 24 hours. When the blood sugar percentage falls to 0·07 (the normal being 0·1%) under a dose the patient may first complain of hunger, weakness or fatigue; he may even show signs of a definite neurosis with loss of emotional control, such as crying spells. A lowering to 0·05% produces very acute distress or mental disturbance.

These reactions are relieved by food; 50 to 100 Cc. of orange juice is effectual or 5 to 25 Gm. of Glucose with the orange juice. When the patient is unconscious give 1 Cc. Epinephrin solution (1 in 1,000), intramuscularly, followed by Glucose *per os.*

Nurse with care, because reactions may occur during sleep.—Banting and co-workers.—B.M.J. i./23,8.

The Medical Research Council directions add, that, *if necessary, 5 to 20 Gm. of glucose in 50 to 100 Cc. of diluent may be given intravenously, and that out-patients under treatment should carry sugar with them to be eaten at the first sign of these hypoglycæmic reactions.*

An account of the first 50 cases treated. The danger of a hypoglycæmic reaction is guarded against by sufficient Glucose given intravenously at the same time. Diabetes in children, it is stated, is readily responsive to treatment.—Banting, Best, Collip, Campbell and Fletcher, Can. Med. Assn. Jl., March, 1922, B.M.J. i./23,8.

The secret of success lies in correct balancing of diet against dose employed. —F. G. Banting, B.M.J. ii./24,376.

Hypoglycæmia is dangerous in patients with cardiac complications. Œdema may be considerably increased, an attack of angina pectoris brought on, or a paroxysm of auricular fibrillation.—per Pres., Dec., '29,409.

Injections of Pituitary given simultaneously with Insu either reduce, or abolish or replace, by a rise of blood sugar, the f due to Insulin. The work confirms, as is known that in cases pituitary insufficiency there is a raised carbohydrate intolerance. Proceedings of Physiological Society, Feb. 1923, M.P.C. May 9/23,3 See also C. M. K. Geiling and co-workers, Jl. Ph. & Exp. The June,'29,241.

1 Cc. of 1 in 1,000 Adrenalin Solution, or 10 units Pituitary Extra intramuscularly generally restores consciousness in 5 to 10 minut Patients should always carry sugar in pocket and a notice aski that Adrenalin and Sugar be given if found unconscious.—Joh Jl. A.M.A. i./29,2168.

The ***estimation of blood sugar*** can be performed by any medi man with a minimum of chemical knowledge. The equipment costs a fe pounds.—Prof. H. Maclean, L. i./23,1043.

For Methods of conducting the Estimation, see Vol. II.

Clinical Experience in English and Scottish Hospitals in less tha 50 cases. It was found that 1 unit of Insulin could provide for the co sumption of 2 Gm. of carbohydrate taken as such in the food of a complete diabetic patient. This is equivalent to 4 Gm. of protein. Hypoglycæm collapse caused by the artificial lowering by Insulin of the blood sugar half its normal level, is at once relieved by giving sugar.—Med. Re Council Rept., B.M.J. i./23,737.

Influence of Insulin on acidosis and lipæmia in diabetes. When give *t ogether with carbohydrates* to patients with diabetic acidosis, verging on com there is a spectacular effect. Importance of combining the two. If give alone it may increase the acidosis.—Prof. J. C. Meakins and co-worker B.M.J. i./23,847.

Insulin in Castor Oil, 100 units to each Cc. Larger doses can b given without causing hypoglycæmic symptoms. Vegetable oils a very slowly absorbed and may cause reaction.—L. ii./30,410

Insulin in oil gives prolonged effect. Castor Oil the best suspend ing agent. The injection must *not* be given intramuscularly bu subcutaneously, *e.g.*, under the skin of the abdomen, the injection bein given before the patient rises in the morning. It is claimed that th method will lead to a greater number of recoveries.—O. Leyton L. i./29,362,756.

Good results with Insulin in *Olive Oil.*—H. Chabanier, Presse Med per Pres., Dec., '31, 05.

Inunction of Insulin with Lanolin and with lard—rabbit experiments The conclusion is that apparently Insulin can be introduced by this measure Crude Insulin extracts could be used.—S. V. Telfer, B.M.J. i./23,715.

Inunction in 6 children. It was proved that Insulin is easily absorbed by the intact skin, its action being greater in infants than in children of more advanced years. In the case of an infant of one year, weighing 9 kilos, Insulin inunction reduced concentration of sugar in blood so successfully that experi ment had to be discontinued prematurely.—L. i./24,407.

Insulin used as an inunction in Almond Oil, in Hydrous Wool Fat, and in Alcohol and Glycerol, was found to have no therapeutic value.—Qrtrly. Jl. Med., Jan., '27,187, per Pres., May, '27,199.

We do not find further statements recently on this method.

Oral Use.

"At present there is no other way of therapeutic administration of Insulin but the needle."—J. Mouzon, Presse. Med., Dec., '29, per M.A. '31,148.

An addition compound with **Desoxycholic Acid** gave results. Magnesium Sulphate in water given 20 minutes previously to ensure that stomach is empty of acids and ferments. Action less intensive than by injection, but more

prolonged. In two cases disappearance of glycosuria preceded fall in blood sugar by some time. Likely to prove of value in children.—Per Pres., Dec., '29,415.

Insulin Phosphotungstate *per os*—not efficacious.—R. D. Lawrence, L. i./31,184.

Latent period of Insulin Phosphotungstate, if effective, would be considerable.—O. Leyton, L. i./31,269. Failed to lower blood sugar.—H. H. Sanguinetti, L. ii./31,212.

Insulin Periodide.

The author prepared this (1929) in the hope that it might be utilised by delayed absorption. It was found to act on blood sugar in much the same way as the parent substance, but there was no delay in absorption, and the blood sugar returned to normal in the same period as when a solution of Insulin was used.

γ **Glucose.**—The effect of Insulin thought to be activation of the enzyme responsible for the conversion of α-β glucose into γ glucose.—B.M.J. i./23,12,479. Criticism.—Edn. XIX, p. 646.

With dogs, injections of Insulin decrease the concentration of Glucose, inorganic Phosphate and Potassium in the blood and increase the concentration of Lactic Acid. It is believed that Insulin influences the reversible reaction, Glucose $\rightleftharpoons$ Lactic Acid.—J. Biol. Chem., '24,58,721, per J.C.S. A. i./24,445.

The **Zymase** group of ferments might have properties similar to Insulin.—O. Leyton, B.M.J. ii./22,1144,1233.

Yeast possibly acts on sugar by converting it first into an unstable form. It is by no means certain that diabetes is invariably a disease of the pancreas. —Leader, L. i./23,708.

GENERAL REFERENCES.

Early work.—L. ii./22,398; B.M.J. ii./22,991.

Prognosis.—A degree of hyperglycæmia may still be present, even when sugar no longer appears in the urine.—D. M. Lyon, L. i./22,1043.

If sugar is found and it then disappears, determine if the power of sugar destruction is diminished; give 100 Gm. glucose in 1 litre of water before breakfast. If the power is diminished sugar is found in the urine $\frac{1}{2}$ hour to 3 hours afterwards. If sugar destruction is normal the urine will be free from sugar.—R. T. Williamson, Pr. Oct., 1920.

The diabetic fails to store sugar, as shown by the blood sugar becoming excessive. He fails to burn sugar, as shown by his respiratory quotient being too low. The injection lowers his blood sugar and raises his respiratory quotient.—O. Leyton, B.M.J. i./23,707.

Insulin greatly reduces the hyperglycæmic action of Adrenalin.—J. H. Burn, per Pres., Oct. 23,334.

Pituitrin secretion is increased by injection of Insulin just as it has been shown to increase adrenalin but this secretion is not obvious in the case of the pituitary until the blood sugar has been considerably reduced.—W. E. Dixon and J. H. Wadia, B.M.J. i./26,820.

It is unwise to give any carbohydrate at all, except that in vegetables, until the fasting value of the blood sugar has been below 0·12% for some considerable time.—G. Graham and C. F. Harris, L. i./23,1150.

The necessity for frequent estimations of blood sugar during treatment is not essential. Do not attempt to get a constantly sugar-free urine—a trace of sugar in the morning is a safeguard.—A. Innes, B.M.J. i./24,55; Pres. May '24,216.

The **Glucose equivalent** (*i.e.*, the amount of Glucose which o unit of Insulin can metabolise) varies with the dose given and wi the amount of carbohydrate in the diet. When carbohydrate i gestion is constant the Glucose equivalent per unit becomes pr gressively smaller as the dose is increased.—F. N. Allan, Am. J Phys. '24, Jan., p. 275, per Pres. May '24,219.

Before operating on diabetic patients it is better to give adequa diet with Insulin (very large doses given), to reduce blood-sug rather than under-feed.—R. Carrasco-Formiguera, L. i./25,1076.

For an emergency operation the procedure is practically the sam as for coma (*q.v.*).—R. D. Lawrence, 'The Diabetic Life,' 1930.

A standard diet for Insulin treatment.—A. C. Begg, L. i./24,51

In cases requiring three doses a day, the long night period caus hyperglycæmia to develop. Counteract by giving last dose aft supper and first dose 1 hour before breakfast.—Pres., Dec. '24,408.

Simple control for Insulin injections.—Leave evenin specimen of warm urine in a pint Thermos flask to fermen with a little yeast; flask must be full and lightly corked. Tak gravity of urine before and after fermentation, and difference repr sents amount of sugar in grains per ounce. Plot the gravities as tw curves and when these are in apposition urinary sugar is absent an treatment correct. Errors in diet are at once apparent. Giv strict carbohydrate-free diet with 3 to 5 ounces of bread. ***Test fo ketones*** with ***Liq. Ferri Perchlor.***—Dark brown colour ind cates urgently the need for more bread and more Insulin. Giv Insulin twice daily. If urinary sugar is measured, daily blood suga are seldom required.—F. C. Eve, B.M.J. i./30,91. See also B.M. i./25,1033 (Abst. in Edn. XIX., p. 649.).

Satisfactory treatment of diabetics as out-patients, the routine tests bein blood sugar and urine estimations, and weight. Colds and similar min ailments, and overstrain and worry, caused increase in blood-sugar pe centages.—C. J. C. Earl, B.M.J. i./27,831.

No true case of diabetes, however severe, proves refractory to Insuli Failure is sometimes due to renal glycosuria without hyperglycæmia. Hepat glycosuria is refractory but is not true diabetes. Diabetic cases with cirrhos of liver take longer but ultimately respond. Some cases of glycosuria may b refractory owing to disorders of thyroid, pituitary or suprarenal. Diabet complicated by severe infections ultimately respond to Insulin, if given b enough doses. Many cases of failure of Insulin are due to the patient su reptitiously increasing the diet.—Prof. Marcel Labbé, per B.M.J. i./27,530.

Acetonuric vomiting of children from 4 to 6 years well treated with 10 t 15 units of Insulin subcutaneously, followed by carbohydrate meal. Effec of Insulin lasted three hours.—Per Jl. A.M.A. ii./25,1167.

As much as 200 units a day needed in some cases.—G. Graham, B.M.J ii./25,702.

Carbohydrate metabolism in health and disease.—Hugh Maclean, I i./26,1129,1242.

A review of the later results of Insulin treatment.—A. P. Thomson, B.M.J i./26,613.

Blood sugar in the normal and diabetic.—C. D. Shapland, L. ii,/26, 589

Insulin is no longer looked on as a cure for diabetes. Only necessary i about one-third of cases, *i.e.*, mainly in patients suffering from complication such as gangrene or acidosis. In true pancreatic diabetes Insulin acts a substitute for missing internal secretions, and in other forms allows physio logical rest for the exhausted gland.—P. J. Cammidge, B.M.J. ii./25,1129.

Potassium ions enhance and Calcium ions reduce the effect of Insulin on the blood sugar.—Per Jl. A.M.A. ii./25,859.

Anaphylaxis due to Insulin.—B.M.J.E. ii./25,13.

Only one diabetic patient seen who failed entirely to respond to Insulin administration.—Prof. H. Maclean, The Results of Insulin Therapy in Diabetes Mellitus, B.M.A., 1927; B.M.J. ii./27,1015: see also *ibid.*, Prof. K. A. Petren, 1019 and P. J. Cammidge, 1020.

The effect of ***injections properly distributed*** on the subcutaneous tissues is very little over many years. Intradermic and intramuscular injections inadvisable and may produce focal necrosis. Prolonged injections into a limited area may produce marked fibrosis and fat atrophy.—R. D. Lawrence, L. i./28,1328.

Eosinophilia found in 10 out of 20 diabetics treated with Insulin—absent in cases treated without Insulin. No definite explanation available.—R. D. Lawrence and O. Buckley, B.M.J. i./29,597, see also *ibid*, 714.

Personal experiences with Insulin. Previously forced to give up work and live on starvation diet. Now able to do 14 hours work a day.—R. D. Lawrence, B.M.J. i./31,1077.

Atrophy (3 cases) of subcutaneous fat at site of Insulin injections, possibly due to presence in Insulin of fat-splitting ferment. Site of injections should be varied as much as possible.—E. A. Carmichael and G. Graham, L. i./28,601.

Wasting effect on subcutaneous tissue.—W. W. Jeudwine, B.M.J. i./31,1145.

Local absorption of fat due to Insulin injections.—L. R. Woodhouse Price, L. i./30,1015.

Diabetes Mellitus and Heredity.—The marriage of diabetics is clearly inadvisable, and intermarriage between families where there is even a remote history of the disease is to be discouraged, and where such marriages occur the children and grand-children, even to the third and fourth generation, should be watched and guarded as far as possible from exciting causes likely to develop a latent and inherited defect.—P. J. Cammidge, B.M.J. ii./28,741. See also Joseph A. Parkes, *ibid.* ii./29,1008.

Falta's treatment is to give back to the diabetic patient active, unrestricted life with aid of Insulin. Variations between 100 and 200 Gm. of fat cause no change in Insulin requirements or increase sugar in urine.—L. i./29,50.

Highly purified forms dangerous—greater risk of overdosage. Less potent preparations make for safety.—Chabanier, per Pres., Dec., '29,409.

Physiology of Glycogen and the role of Insulin and Epinephrin in carbohydrate metabolism. The intestinal mucosa absorbs hexoses more rapidly than pentoses.—J. J. R. Macleod, L. ii./29,1,55,107.

Glucose intolerance in various dermatoses. Abnormalities in blood sugar content.—L. ii./29,1141.

Advantages of Rich Carbohydrate Diet.—J. A. Nixon, B.M.J. i./30,326. See also R.S. Med. Discn., B.M.J. i./31,309.

Diabetes as a physiological problem.—Oliver Sharpey Lectures, Prof. J. J. R. Macleod, B.M.J. i./30,868,918.

Diabetic Coma.—Desperate Cases treated by 100 units and large vols. of fluids (Gum Saline) intravenously.—R. D. Lawrence, B.M.J. i./30,690.

Diabetic coma usually due to carelessness on part of patient. Loss of an hour inexcusable delay. Most cases saved by initial dose of 60 units. Fear of hypoglycæmia groundless. Early treatment and sufficient dosage essential; a minimum of 200 units necessary to cure coma with goodly portion of this as initial dose.—W. R. Campbell, M.A. '31,142.

Since the war diabetes has apparently become more common.—M.R.C. Ann. Rept., 1929-30, B.M.J. i./31,466.

Relatively high carbohydrate diet in diabetes. Results at General Hospital, Birmingham.—R. Gittins, L. i./31,321.

Septicæmia in a diabetic. Inhibition of Insulin action.—R. D. Lawrence and R. A. McCance, B.M.J. ii./30,749.

Asthma.—Five units of Insulin twice daily, gradually increased to 10 or 12 units, with an ounce of Glucose an hour after each dose, for three weeks: together with Ultra-violet rays and Agar-serum Peptone, of value.—A. G. Auld, B.M.J. i./29,992.

Patients suffering from carbuncles, gangrene of leg, appendicitis, etc., should be prepared for operation by treatment with Insulin. Minor ailments, e.g., tonsillitis, 'colds in the head,' etc., should always be taken seriously and patient should go to bed. It is better to reduce diet by one-third and add another 5 units to dose of Insulin. The relief of constipation is always of great importance.—G. Graham, L. i./24,65.

By injection and local application Insulin is stated to facilitate the cicatrisation of the operation wound and favour healing in non-diabetics.—L. ii./25,241 ; see also B.M.J.E. i./26,52.

Exophthalmic Goitre well treated by Insulin, 5 to 30 units twice daily.—E. G. B. Calvert, B.M.J. ii./24,835. See also Jl. A.M.A. ii./25,1522, and *ibid.*, 1007. Improvement in 2 out of 4 cases with injections of 60 to 100 units daily.—R. D. Lawrence, B.M.J. ii./24,753 ; B.M.J.E. ii./24,13.

Of value only in the pancreatogenous type of exophthalmic goitre, but fails in cases of thyroid origin, and those due to primary hypophyseal disease.—O. Klein, Med. Klin., Feb. 12, '26,248, per Pres., May, '26,214 ; B.M.J.E. i./26,56.

Hyperthyroidism.—Insulin in treatment.—Jl. A.M.A. ii./25,1098. Action variable and inconstant.—M. R. Castex, Rev. de la Soc. de Med. Intern., Sept., '25,471, per Pres., May, '26,214.

Menorrhagia and Metrorrhagia.—Moderate doses injected twice daily before morning and evening meals of value—usually effective within 2 or 3 days. The action of Insulin is not specific, but is related to that of the ductless glands other than the pancreas.—B.M.J.E. i./28,13.

Pregnancy, Vomiting of.—Combined use of Glucose intravenously with Insulin hypodermically—about 2 Gm. Glucose in 10% solution to each unit of Insulin—of value in excessive vomiting of pregnancy and in eclampsia.—Jl. A.M.A. i./26,557.

Pulmonary Tuberculosis.—Increased appetite and progressive increase in weight with subcutaneous injections of 5 units before meals.—Morin and Bouessée (Leysin), per Pres., May, '28,187.

Skin Diseases.—Insulin in treatment.—M. Ferond, Le Scalpel, Mar. 6, '26,221, per Pres., Oct., '26,344.

Varicose Ulcers.—Insulin injected, and locally, found of value.—P.J. ii./25,180. Ulcers of leg well treated.—B.M.J.E. ii./25,10.

Insulin applied locally (12 units twice a day in the form of a wet dressing) completely healed a resistant non-diabetic ulcer of 5 months' standing in 10 days.—Per Jl. A.M.A. ii./25,473.

*** Synthalin** (T.M. 351691).

An Alkyl-Guanidine derivative, with action similar to Insulin, which has been advocated for slight or moderately severe cases of diabetes. It is taken internally in a single dose of one tablet, containing 10 mgr., 2 tablets 20 mgr., or one tablet 25 mgr., at the commencement of a meal.

For light and moderate cases.—By dietetic treatment the sugar eliminated must have been adjusted to at most 30—45 grains per day.

On the first and third day two 10 mgr. tablets twice, on the second day 2 tablets on one occasion. A respite on the fourth day and then gradually pass from two 10 mgr. tablets to 25 mgr. Directions are varied for other types.

Synthalin lowers sugar excretion by the urine. 1 mgr. is capable of using 1·1 to 1·2 Gm. of sugar. The substance is not a simple derivative of Guanidine or even a simple homologue of the Methylene series. It is intended to improve its composition.—E. Frank, Klin. Woch., '26,45.

Preliminary Reports to the Medical Research Council show Synthalin to be unsatisfactory.—L. ii./27,517, *ibid.*, 649. Results uneven.—G. Graham and R. D. Lawrence, B.M.J. ii./27,1143.

In rabbits, Synthalin, or Decamethylene-diguanidine, in large doses was toxic. The fate of the Glucose was not quite clear : experiments proceeding.—H. H. Dale, B.M.J. ii./27,1141.

The name Synthalin was applied to the Methyl Ester of Piperonyl-Quinoline Carbonic Acid. Danger of identity of name for two totally different substances.—Y.B.P., '27,298.

Notes on Synthalin.—A. W. Edwards, P.J. ii./27,292.

Numerous recent references to Synthalin have been made since our last Edition. The following are the most important:

Unsuitable, if not dangerous, for use in diabetes in man.—Prof. J. R. Macleod, B.M.J. i./30,919; L. ii./30,518.

Reduction of blood sugar after oral use due to injury of parenchyma of liver and not to increased capacity of body to burn sugar.—L. ii./31,412.

Since 1927, Synthalin has been continuously used in the Bristol Royal Infirmary, and 70% of diabetics are now treated with it in place of Insulin. Given correctly, it is devoid of danger and ***gives results equal to Insulin.*** Carbohydrate is allowed fairly liberally, the relation of fat to carbohydrate in grammes in the four stock diets being: F/C; 107; 180, 137; 186, 165; 220, 170; 238. Commence with 2 tablets (10 mgr.) beta-Synthalin morning and evening after meals, with 1 tablet of Dehydrocholic Acid to every 2 of Synthalin. Increase dosage in these proportions to limit of tolerance or until diminution of glycosuria occurs and then reduce to necessary minimum, with rest every third day. A Phosphate mixture is taken thrice daily. Liver replaces meat one day, and sweetbreads half the meat of another day, with Bemax or Marmite daily.—A. T. Todd and Co-workers, Pr. May, '32,531.

Galegin, the alkaloid of *Galega Officinalis,* has a similar constitution to Synthalin and has been used for reducing blood sugar up to 150 mgr. per day, replacing 20 to 30 Insulin units. No secondary effects observed.—P.J. ii./27,563.

Glucosone, or aldofructose (one of the oxidation products of Glucose or Fructose) has similar properties to Insulin and is given by the mouth.—P. T. Herring, L. i./27,1000.

Intarvin.—An artificial fat made from fatty acids, having an odd number of Carbon atoms and proposed for use in diabetes, on the ground that such fatty acids do not yield ketone bodies on oxidation in the normal or diabetic organism, and might therefore with advantage replace natural fats in the diet (N.N.R., '25,219). From clinical observations, however, on cases of diabetes mellitus, it would seem that further investigations are needed to substantiate the claims made.—D. Lyon and co-workers, B.M.J. i./25,209.

Has definite but limited field in diabetic treatment. No toxic symptoms, but pronounced unpalatability.—Per Pres., Dec., '28,417.

***Sionon.** (T.M. 355471).—A purified form of Sorbitol (the Alcohol corresponding to Dextrose) prepared by reduction of Grape Sugar and Fructose. A white crystalline powder with calorific power equal to Glucose. May be given to diabetics up to 30—80 Gm. daily with other foods.—Per Pres., Dec., '29,419. Can be metabolised more easily than glucose. Quantities up to 3 ounces a day rarely produce diarrhœa.—B.M.J. ii./30,105.

A substance made from liver by the Blotner and Murphy method found completely inactive in rabbits. No oral substitute for Insulin as yet.—P. C. Brett and co-workers, L. i./31,32.

PAPAIN.

Syn. PAPAYOTIN. *Dose.*—1 to 8 grains (**0·06 to 0·5 Gm.**).

Whitish, amorphous powder, prepared from the juice of the Papaw, *Carica Papaya* (*Passifloraceæ.*). 75% should be dissolved by absolute alcohol.

Papaw fruit, fresh, divested of its seeds, in shape like a vegetable marrow, is a refreshing dessert fruit, with flavour something like the melon. It is commonly used as a table fruit abroad. It is thought to have digestive properties. The author has imported the fruit '*canned*' in syrup. The tree is indigenous in India, East and West Indies, Hawaiian Islands, in Ceylon and other tropical parts.

The fruit contains Vitamin C in abundance, with less Vitamin A, and still less B.—Jl. A.M.A. i./29,672.

Manufacture of Papain.—The fruit while remaining on the tree is lightly incised several times at intervals of 2 or 3 days with a bone knife and juice collected in calabashes containing a little water. The juice is rapidly dried—the coagulated milk being exposed to the sun or artificial heat on glass or linen frames at not exceeding 100° F., subsequently while still warm powdered in a drug mill.

The natural colour of Papain is light brown. Bleaching is said to be a great mistake. Adulterants include bread, boiled rice, starch and the milk of gutta-percha and the wild cactus.

The fruit is sometimes called the tree melon. The leaves are used for wrapping round fresh meat to render it tender. The juice of the fruit is also rubbed into meat for this purpose or a piece of the fruit is placed in the water in which the meat is boiled. A tree bears on an average thirty fruits a year and lasts some 5 years as productive and worth cultivation. A trace of formalin should be added to the juice as collected by scarification. A dozen fruits yield about ½ lb. of dried granulated crude papain at one tapping. Huybertsz found the Ceylon Papain will digest 200 or 300 times its weight of albumen, while West Indian only digests 75.—H. F. MacMillan, C.D., Jan. 30, 1915.

Assay.—Examination showed that 0·4 Gm. Papain will peptonise 100 Cc of 4% Alkaline Casein Solution in 1 hour.

Uses.—As a digestive in chronic cases of dyspepsia with acid eructations and painful gastric fermentation. It acts in acid, alkaline or neutral media, has the property of digesting fibrin like pepsin (as much as 200 times its weight in some cases). It has the property of curdling milk like rennet and might be used as a substitute for the latter.

The Liquid preparations are suitable for use in cases of enlarged tonsils—after persevering treatment, improvement in nasal breathing can be observed—due to reduction of the swellings.

Ulcers and fissures of the tongue have been painted with a solution of Papain 1 to 2 in 10 each of glycerin and water.

Juice from the unripe fruit is very acid and acts as an efficient vermifuge and is also a galactagogue and antiscorbutic.—S. G. Willimott, P.J. ii./28,219

Elixir Papain.—*Martindale.*

Dose.—1 drachm (**4 Cc.**) with meals.

Glycerinum Papain.—*Martindale.*

Dose.—1 drachm (**4 Cc.**) with meals as a digestive.

It has also been used as a pigment for chronic eczema and warts and has been applied to diphtheritic exudation.

Tabellæ (of chocolate basis) contain 2 grains (**0·12 Gm.**).

Trochisci Papain ½ grain (**0·03 Gm.**).

℞ **Pilula Papain Composita.**

Dose.—1 with meals. Papain 2 grains, Extracts of Nux Vomica ⅓ grain, Belladonna ⅙ grain, Aloes ¼ grain. A digestive laxative.

Pulvis Papain Compositus. E.L. *Dose.*—5 grains (**0·3 Gm.**) Papain 1, Sodium Carbonate 2, Sugar 2.

Liquor Papain et Iridin.

Dose.—2 to 4 drachms (**8 to 15 Cc.**). Papain 120 grains, Iridin 150 grains, Glycerin 2 ounces, Sherry 5 ounces, Chloroform Water to 1 pint. Macerate 7 days and filter.—From Ph. Form., 1911 p. 890 modified.

PARAFFINA.

The Paraffins used in Pharmacy are arranged herein in order of consistency, commencing with the Hard and following in rotation with soft compounds, Liquid Paraffins of various gravities, and finally the light fractions known as Amyl Hydride, Petroleum Spirit, etc.

Paraffinum Durum.—*Syn.* PARAFFIN WAX.

A mixture of several of the harder members of the paraffin series of hydrocarbons $C_{20}H_{42}$=282·3276 to $C_{27}H_{56}$=380·4368; obtained, by distilling shale, separation of the liquid oils by refrigeration, and purification of the solid product. Colourless, semi-transparent, crystalline, inodorous, and tasteless, slightly greasy to the touch. Sp. Gr. 0·82 to 0·94. Insoluble in water, slightly soluble in absolute alcohol, soluble about 1 in 80 in ether; *insoluble in Acetone*—a fact of value in analysis of mixtures. It burns with a bright flame, leaving no residue. Hard paraffins are supplied with the following melting points:—100°, 104°, 110°, 115°, 120°, 125°, 127°, 130°, 135° F. (*B.P.* '14) employs from 122° to 140° F.

U.S. has M.pt. 50 to 57° C. (122 to 135° F.).

Ceresin. A hard white paraffin prepared from ozokerite or earth wax; has M.pt. about 130° F. When artificially coloured to resemble yellow wax it is sold as **Yellow Ceresin. Ozokerit** is a hard paraffin obtained from Galician deposits.

Solid Paraffin Injections.

For subcutaneous injection in plastic operations this should be hard paraffin with M.pt. 110—115° F. *not an extempore mixture.* Used to improve the size and shape of the nose, ear, etc., where abnormal, also for injecting into cavities after previously swabbing out with antiseptic lotion. The injection should be made in a warm room to allow of the flow of the melted substance through the syringe needle.

In facial surgery.—S. Mort, L. ii./19,105.

Ozæna treated by injecting high melting paraffin into the nasal septum.—B.M.J.E. i./15,36.

PAINFUL RHEUMATIC JOINTS.—Envelop the limb (previously shaved) quickly in a thin layer of melted Paraffin at a temperature of 80 to 85° C. and add until layer is 1 to 2 cm. thick. Apply flannel bandage and leave on for 5 hours.—Per Pr., June, '28, 397.

Paraffin Wax bath over the whole body applied in sections at a time for applying heat to the skin.—H. W. Hales, L. ii./31,586.

Paraffinoma.—Two cases following Paraffin injections. One of the rectum due to liquefied hard Paraffin, the other stated to be due to an injection of Camphor in Paraffin Oil in the thigh.—A. T. Bazin, B.M.J. ii./29,1102.

Paraffinum Molle (*B.P.* '14).—*Syn.* PETROLATUM, U.S. and PETROLATUM ALBUM, U.S., PETROLEUM JELLY, VASELINA, F.E. VIII., VASELINUM P. Ital. V., P. Belg. IV.

A white or yellow semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydrocarbons $C_{15}H_{32}$=212·256 to $C_{20}H_{42}$=282·336. Melts at 42 to 46° C., or even somewhat higher (U.S. requires 38 to 54° C.). Is usually obtained by purifying the less volatile portions of petroleum.

Soluble in alcohol slightly, freely in ether and chloroform, insoluble in water *and in Acetone.* When melted, it mixes with oils, and many waxes, oleates, and oleic acid.

Soft paraffin is not readily absorbed, but is emollient, protective and useful for surface action, *e.g.*, for compounding with lead, mercury, zinc, and sulphur iodide.

Absorption.

It is commonly thought that Paraffins injected into tissues (as in Beck's Bismuth Paste) are not absorbed. It was proved in Germany that this only applies to hard paraffin.

Intra-articular injections of Vaseline admirable in certain cases of painful and grating joints including morbus coxæ senilis and dry traumatic arthritis. For a knee joint 15 Cc., for the hip 20 to 25 Cc. If the joint contains fluid, its further secretion may only be stimulated by injection of Vaseline.—B.M.J.E. ii./13,78.

✱ **Vaseline** (T.M. 12486, 479708) Brand Petroleum Jelly is available in yellow and white varieties.

It resembles the **Vaseline Officinale** or **Pétroléine** of the Fr. Cx.—that which remains over after distilling American Petroleum at 360° C. and purifying. 2 to 5% 'Paraffin' is directed to be added according to season or climate to improve its consistence.

High Melting "Vaseline" is also prepared with M.pt. 46·1° C. (115° F.), suitable for warm climates.

Unguentum Paraffini made with Hard Paraffin (M.pt. 54 to 57° C.) 27, Soft Paraffin 70, Beeswax 3, is suitable for use with the atmospheric temperature, 15° C. May be modified to meet the exigencies of climate and temperature.

The addition of 3% Beeswax makes the ointment more uniform.

A hard Paraffin with somewhat low melting point, *e.g.*, 46 to 52° C. is best. Our experiments showed it is well to melt together and set aside to crystallise (or allowed to cool on the water bath) and then mill, rub down, or sieve again.

A small quantity of wool fat added to soft or liquid paraffins enables the production of a stable Emulsion, *vide* Vasenol.

Ceratum Petrolei is a firmer basis than the Soft Paraffin and is a good protective.

White Soft Paraffin 2 parts, Hard Paraffin (135° to 140°) 1 part. Melt and stir until cold in an evaporating dish.

'Collapsible Tubes' of Soft Paraffin with catheter and rectal attachments are suitable for uterine and rectal medication. The base may be medicated with antiseptics and astringents; for formulæ, *vide* Index.

Ceratum, U.S. White Wax 30, Benzoated Lard 70. Melted together and stirred until the cerate congeals. In hot seasons and warm latitudes, White Wax 50 or more may replace an equal weight of Benzoated Lard.

Paraffin Treatment of Burns.

Paraffin "No. 7" is made as follows :—

Melt hard Paraffin 67·75 and add Soft Paraffin 25 and Olive Oil 5. Then mix in carefully Beta-Naphthol 0·25 dissolved in Eucalyptus Oil 2, after the mixture has cooled to about 55° C. (The original mentions Resorcin 0·25 to 1% as alternative and that a small quantity of Absolute Alcohol is to be used as solvent). The finished article melts at about 48° C.

Method of Use.—Wash the burns with sterile water, dry thoroughly for example with a fan and spray or apply the melted preparation carefully with a flat camel hair brush. Cover with a thin layer of wool and a second coating.

Severe burns accompanied by sloughing and in a very septic condition cleaned and became healthy. Cordite, Petrol and Liquid Fire burns healed. Also suggested for frost bite.—A. J. Hull, B.M.J. i./17,37. Wounds and Burns treated—nothing so effectual.—E. F. Pratt, B.M.J. i./19,243.

Other formulæ.—No. 10 Red (containing scarlet), No. 12 Brilliant Green, No. 13 Flavine Wax, No. 14 Dichloramine Wax. The No. 7 with preliminary painting of surface of the burn with 1 in 1,000 Flavine gives the best results.—A. J. Hull, B.M.J. ii./17,788.

'Paraffin No. 7 Modified' has been made using Spermaceti and Hard Paraffin *p. eq. vice* Hard Paraffin. The preparation melts at 49° C. and is filled into rubber-capped tubes for use at time of operation, after melting in the water bath.

***Ambrine** (T.M. 380347).—A similar preparation advised by B. de Sandfort (a compound of Paraffin with 5% Oleum Succini, L. i./17,318). Applied in similar manner.

Results better than those with Picric Acid. Pain alleviated, scar formation prevented. It has elastic and adherent properties.—B.M.J. ii./16,329,333.

Preparations similar to Ambrine used with advantage in eczema, varicose ulcers, neurodermatitis, intertrigo, fissures and chilblains. Paint on and cover with thin layer of cotton wool, then a second film of paraffin, cotton wool and bandage. Relieves itching.—B.M.J.E. ii./21,1.

Of value in the after-treatment of ear operations.—B.M.J.E. ii./25,88.

Dental Wax. Hard Paraffin 1 ounce; Beeswax 6 ounces, melt together, add ½ ounce Alkanet and keep warm for two hours, then strain and add Tincture of Tolu 2 drachms, Otto of Rose 5 drops. Generally supplied in sheets 6½ by 3½ inches. *Use.*—The sheet is warmed over the flame and moulded carefully over the model. It is used for mechanical purposes prior to vulcanisation.

Oleum Petrolei Flavum and **Huiles Lourdes de Petrole.**

Heavy Petroleum Oils—products from American Petroleum. Distilling between 280 and 400° C. Sp. Gr. 0·880 to 0·905. Used as a vehicle for **Hypodermic Injections.** For the suspension of insoluble mercurial salts, such as calomel, salicylate, succinimide, benzoate and yellow oxide of mercury, 1, 5 or 10% mixtures being employed.

Vaselinum Liquidum. *Syn.* **Huile de Vaseline, 'Vaseline Liquide',** Fr. Cx. is prepared from Caucasian Petroleum by purifying the fractions between 335° and 440° C. Sp. Gr. about 0·875, *i.e.*, it approximates *Paraffinum Liquidum* in character. Employed in Huile Grise *q.v.* F.E. VIII., P. Ital. V. and P. Belg. IV. similar.

Paraffinum Liquidum (*B.P.*'14).—*Syn.* Oleum Petrolei, Petrolatum Liquidum, U.S. Chrismaline, *Paroleine (T.M. 248370).

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation. Sp. Gr. 0·860 to 0·890 (*B.P.* '14). For spraying as also for 'Toilet Paraffin' is preferred with gravity 0·865 to 0·870. *For internal use* 0·880 *to* 0·885 *is preferred.* Below 0·880 it is not suitable as an internal lubricant. U.S. has two varieties,—one termed Heavy, the other Light Liquid Petrolatum—with different viscosities.

A careful clinical comparison of treatment with low (130) viscosity Liquid Paraffin, Sp. Gr. 0·8718 and high (230) of Sp. Gr. 0·8902, showed that the latter had a slightly more laxative action and there was decidedly more tendency to leakage with the low viscosity oil. The highly viscous oil was more satisfactory in general. A standard of not less than 180 should be adopted.—H. B. Russell and P. C. Brett, L. i./23,594.

In our opinion the gravity should be at least 0·880 *and the viscosity at least* 180.

Samples which we have had examined had viscosities 281 and 290.

(We deal further with the question of viscosity in *Vol. II.*).

Russian Oil contains principally Saturated Hydrocarbons while **American** petroleum contains a large proportion of the unsaturated Olefines. The Baku Oils differ from Pennsylvania and other U.S. Oils in consisting largely of hydrocarbons of the Naphthene group. (Saturated single link *ring* compounds). American oils are best for chlorinating. *cf.* p. 48.

Russolax is distilled and refined in England. It has high viscosity (275 seconds at 100° F.).

Uses.—Liquid and Soft Paraffin are employed as electuaries or lubricants in constipation. Also of use for colitis in children internally. By its lubricating action taken regularly, it may avert appendicitis. It has been suggested there is danger of it causing cancer, but we do not agree. It is a good catheter lubricant.

It is used as a basis for laryngeal and nasal spray solutions or pigments, containing menthol (1 in 8 or more), cocaine (soluble only 1%) or other medicaments. *Alkaloidal bases and their salts are in general only very slightly soluble in any of these liquid paraffins.* A little Oleic Acid added assists solution.

Enteric with constipation in Egypt well treated.—L. ii./14,231,421.

'PARAFFIN PAIN' from giving Liquid Paraffin as an intestina lubricant may be due to poor viscosity, but may also be due to the time of giving the oil. The pain corresponds often to the hunger pain described in cases of duodenal ulcer. Give small doses, say 2 dr., and not immediately after food, or one dose of one ounce at bedtime, increasing gradually if necessary.—S. Samuel, Pres., Oct., '20.

Given as a lubricant Liquid Paraffin enters the cæcum mixed with the iliac contents and keeps the contents of the large bowel soft. In addition it accelerates the passage of the fæces through the large intestine which consequently does not become overloaded. The whole of the ingested Paraffin can be recovered from the stools—there is no toxic action even with large amounts. Sir W. A. Lane was the first to popularise Paraffin for internal use.—J. W. Peck, P.J. i./14,28,508.

Its action on the bowel is due in great measure to its ability to form emulsions, holding about 15% more water than usual in the stool.—Munch. Med. Woch, per P.J. ii./27,461.

Liquid Paraffin should ***be given ½ hour before food.*** 7 to 10 minims of Tinct. Belladonna after breakfast and dinner helps the onward passage of contents of unhealthy colons.—A. Greham-Stewart, L. ii./30,874.

No ***'a priori' reason why Paraffin should replace other laxatives.*** May be irritant. The primary defect in constipation is in the neuro-muscular mechanism controlling peristalsis in the stomach and small intestine, and mass movements in the colon—these movements are not necessarily stimulated by either bulky or rough residue.—L. J. Green, L. ii./30,993, 1044.

In colitis suitability questioned.—Cascara group preferable.—L. J. Green, L. ii./30,771. Refer also to E. Spriggs, *ibid.*, 635.

ECZEMA ANI consequent on the taking of Liquid Paraffin for chronic constipation.—R. Gibson, B.M.J. i./27,876.

HERPES ZOSTER.—*Paraffin dressings* found of great value for the relief of pain; effective only during the eruptive period.—Howard Fox, per Pres., Feb., '23,83.

RECURRENT GENERALISED ECZEMA MADIDANS.—Local use of Liquid Paraffin effective.—B.M.J. ii./13,1013.

WOUND DRESSING.—Medicinal paraffin good.—B.M.J. i./22,940. See also our p. 655.

SCOTTISH SHALE OIL INDUSTRY.—Dermatoses of paraffin workers.—Alexander Scott, B.M.J. ii./22,381.

Emulsio Petrolei cum Hypophosphitibus. *Martindale.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

Some experiments conducted by us in 1907, with a view to making a satisfactory 50% Emulsion, gave the following as the best of a number tried.—Rub Powdered Gum Acacia (good) 4 ounces with Liquid Paraffin 8 ounces, Soft White Paraffin 2 ounces, Cinnamon Oil 24 minims. Then add in two portions a solution of Sodium and Calcium Hypophosphites of each 192 grains, Saccharin Elixir 90 minims in Water 10 ounces.

Equal parts of Liquid and Soft Paraffin produce a thicker emulsion.

Emulsio Paraffini cum Pancreatino.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

Liquor Pancreaticus 2 ounces included in this formula.

For the intestinal stasis of tuberculous children drachm doses of this preparation promote healthy function of the bowel.

Emulsio Paraffini et Bismuthi.

Dose.—One ounce (**30 Cc.**) first thing in the morning and at bedtime, followed by ⅔ tumblerful of moderately hot water.

Liquid Paraffin 1 ounce, Clove Oil 10 minims, Sodium Bicarbonate and Compound Tragacanth Powder of each 1 drachm. Emulsify with Chloroform Water ½ ounce, and Solution of Bismuth 1 drachm and add in portions Chloroform Water to 8 ounces.

The small dose of Bismuth is intentional. In some cases larger quantities may prove constipating. The formula is varied to suit the case, *e.g.*, Peppermint Oil 10 minims may replace the Clove Oil, varying doses of Bismuth Salicylate, or Subgallate, may replace the Bismuth Solution, and where there is constipation Vinum Aloes or Compound Tincture of Aloes ½ ounce to 1½ ounces may be incorporated.

Catarrh of the alimentary tract is frequently responsible for toxæmia due to insufficient or impeded action of the liver and pancreas. This condition is often the cause of affections of the circulatory system (heart troubles, etc.), coupled with evidence of rheumatoid arthritis and of fibrositis.—W. Bezly Thorne.

Milk Casein as emulsifying agent for Paraffin Emulsions.—P.J. ii./13,208.

The following are flavoured preparations :—

Aperfine Liquid. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**). Liquid Paraffin flavoured with Oil of Lemon.

Aperfine. *Dose.*—2 to 4 drachms (**8 to 15 Gm.**) is similar but in paste form. It contains 70% of White Soft Paraffin.

These act purely physically, hence produce no evil effect or habit.

***Aperol** (T.M. 290001), **Delectol** and **Internol** are prescribed.

***Cristolax** (T.M. 375774, 435407). A compound of 50% Liquid Paraffin with 50% Malt Extract in powder form.

Fructolax. *Dose.*—2 to 3 drachms at bedtime. A lenitive and laxative containing about 80% soft Hydrocarbon with fruit basis.

***Maltaffin** (T.M. 355917). A paraffin and malt preparation, *v. p.* 542.

***Semprolin Emulsion** (T.M. 353942).—A lubricant to the alimentary and intestinal tract. Contains 60% Liquid Paraffin. Combinations with Bismuth and Pepsin, Glycerophosphates, Hypophosphites, Iron, Lecithin, Guaiacol, Malt, Salol, etc., are made. Semprolin Cream containing 90% Liquid Paraffin and Semprolin Carminative are also prepared.

Emulsio Paraffini cum Rhamno Frangula.

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Liquid Extract of Buckthorn Bark 1 ounce, Liquid Paraffin ounces, Benzoic Acid 5 grains, Irish Moss Decoction to 8 ounces A mild laxative.

***Paraffagar** (T.M. 355918).

A combination of Hydrocarbon Oil with Agar Agar in the form of a jelly as an efficient electuary, without weakening effects.

Dose.—1 to 2 drachms at bedtime. Children, ½ to 1 drachm increased if necessary.

Paraffagar with Phenolphthalein. *Dose.*—1 to 2 drachms, containing Phenolphthalein ½ grain in 1 drachm.

CONSTIPATION OF PREGNANCY.—Phenolphthalein and Paraffin found best.—W. H. F. Oxley, B.M.J. i./31,7.

***Paraffagar Capsules.** *Dose.*—One or two at bedtime, increased if necessary. This is a convenient preparation.

Confectio Petrolei K.C.H. *Syn.* LAXAR.

Dose.—1 to 2 drachms.

Agar Jelly 4%, 1 ounce, White Soft Paraffin 1 ounce, Peppermint Oil minims, Cassia Oil 2 minims, Saccharin ½ grain.

Emulsio Paraffini Liquidi cum Agar Agar (50% Paraffin and 0·8% Agar Agar).

Dose.—½ to 1 ounce or less if requisite morning and evening. Children 1 to 2 drachms.

We have conducted a number of experiments to provide a satisfactory formula. The following, worked out in the author's Laboratory (1927), gives a good result:

Dissolve Agar Agar 0·8 in Water 46 and strain hot into the following, mixed:—Gum Acacia 2·1, Tragacanth 0·3, Sodium Benzoate 0·2, Liquid Paraffin 50, the last ingredient being made sufficiently hot. Stir vigorously until cold. Finally incorporate Saccharin Elixir 0·5, Vanillin Solution 0·1, Lemon Oil 0·1.

Emulsio Paraffini Liquidi cum Agar Agar et Phenolphthalein.

Dose.—½ to 1 ounce or less if requisite morning and evening. Children 1 to 2 drachms.

The formula is as above, incorporating *secundum artem* Phenolphthalein 1 grain per ounce dose.

Liquid Paraffagar and **Liquid Paraffagar with Phenolphthalein** are representative of the two last mentioned.

Ⓟ**Paraffinum Compositum Liquidum.** CAN. FORM.

Mix the following intimately, to make a homogeneous liquid. Camphor 3·4, Menthol 1·0, Thymol 0·5, Eucalyptol 1·0, Oil of Wintergreen 3·4, Hydrastine 0·015, and Liquid Paraffin a sufficiency to make 1,000. Is suitable for use as an antiseptic and astringent 'Nebula.'

Nasal passages and throat should be kept clean with a simple oily preparation, *e.g.*, Liquid Paraffin, as they are frequently the paths of infection, for pneumonia, rheumatic fever, influenza and diphtheria, also for cerebro-spinal fever and poliomyelitis.—Sir James Barr.

Capsules (Gelatin), with pointed ends, of **Sterile Liquid Paraffin** are made for lubricating catheters, etc.; they contain 30 minims.

Wound Dressing with Liquid Paraffin.

At one stage in the war there was enthusiasm for ' Oil ' as a wound dressing for uncomplicated wounds.

Casualty Clearing Station results show success with Liquid Paraffin preparations. Gauze used for packing a wound smeared with a Paraffin Paste should be wrung out of Liquid Paraffin or Iodoform-Paraffin 1%.—Col. H. M. W. Gray, B.M.J. i./17,509. *See also* Iodine in Paraffin.

Lotio Paraffini Composita.

Soft Paraffin 3 ounces, Balsam of Peru 2 drachms, Mercuric Oleate 60 grains, Olive Oil 1½ ounces. To be applied with a stiff brush. For parasitic skin diseases.

Gauze soaked in paraffin for wounds.—J. Campbell, L. ii./18,477,495.

Creosoted Oil: (Calot's formula.) Liquid Paraffin 70 Gm., sterilised by boiling for ½ hour. Allow to cool and add in order (1) Creosote 5 Gm., (2) Guaiacol 1 Gm., (3) Iodoform (sterile) 10 Gm., (4) Ether 30 Gm.

Used as a wound dressing.

Injection of 10 Cc. weekly of Calot's fluid with ***Olive Oil*** in place of Liquid Paraffin of distinct value following aspiration of cold abscesses and in treatment of white swellings of joints. **Calot's No. 2 Paste :**—Phenol Camphor 3 Gm., Naphthol Camphor 3 Gm., Guaiacol 8 Gm., Iodoform 10 Gm., Lanolin 150 Gm., Spermaceti 100 Gm., of value for injection in sinus formation in disease of hip, spine and knee. 10 Cc. injected into sinus at temperature of 103° repeated every fourth day for 10 occasions. Albuminuria and septic infections causing pyrexia contraindications.—R. Pollock, L. i./27,225.

OTORRHŒA.—Calot's Solution of value. Instil 5 to 10 drops into ear canal. To get fluid into Eustachian tube close opening of external canal by pressing tragus against canal wall and bringing alternate pressure to bear on it so as to cause pumping action on mixture, and continue until patient feels medicament in throat. Repeat nightly for a week. When secretion becomes thin discontinue and dry up with insufflations of Boric Acid Powder.—I. Hamick, Jl. A.M.A. ii./29,66.

The various **Lubricating** and **Lighting Oils,** *e.g.* **Kerosene**-fractions between 150° and 300° C. with Sp. Gr. about 0·790 to 0·81 and **Mineral Naphtha** (to be distinguished from Solvent Naphtha *q.v.*), are the next fractions, and are mentioned here to render the series more complete.

(NOTE.—During the war and probably since—the benzol, toluol and xylol fractions were removed from mineral naphtha in great measure, thus producing a liquid with much higher boiling point.—Abel Scholar, C.D.)

Lefroy's Crude Mineral Oil Emulsion. *Syn.* **Petroleum Insecticide.**

Crude Mineral Oil (Kerosene) 110, Soft Soap 50 (whale oil soap is specified) with about 10 of water to form a jelly. For use against lice, fleas, flies, etc.—both destroying them, preventing their further attack and thereby acting as a prophylactic to many forms of infectious disease—typhus, typhoid, diphtheria, diarrhœa, dysentery, consumption, etc. It is used like ordinary soap for washing. If a little be allowed to dry into the clothes vermin will not approach. The same effect is secured by rubbing a little over the skin.—H. Maxwell-Lefroy, L. i./15,1150.

***Vermijelli** (T.M. 365780). A preparation originally devised for spraying plants after dilution. The following is similar :—Whale Oil Soap 160, Crude Petroleum 110, Naphthalene 4.—H. M. Lefroy, B.M.J. i./15,317. In conjunction with ' N.C.I.' (*q.v.*), was used in the war.

Favus has been cured by soaking with Petroleum of commerce.

Solar Oil.—A product of Shale Oil distillation. It is the next fraction after the Benzene and Kerosene have distilled. Sp. Gr. 0·860. Flash point 104·4. Used as a high grade fuel oil.—C.D. ii./30,151.

Huile de Petrole, FR. CX. has Sp. Gr. 0·800 distilling between 130° and 180° C. from American Petroleum. Flash point not below 35°.

'Petrol.' *Syn.* GASOLINE, ' MOTOR SPIRIT.'

Sp. Gr. 0·720 to 0·750. Data as to B.pt. and commercial varieties.—*Vol. II.*

Wounds, swabbing out with Petrol gave good results.—M. H. Embree, B.M.J. ii./16,327.

Of great value for cleaning cuts, abrasions, septic wounds and burns ; als in the early stages of diphtheria and similar diseases—by swabbing the naso pharynx with lint soaked in petrol it is possible to cut the disease down to minimum.—G. A. Stephens, Pres., April, '23,140.

Petrol Poisoning resembles drunkenness. Treatment: little to b done beyond placing patient in fresh air and keeping him warm.—B.M.J. i./15,769.

Antidote.—Camphor Injections and Oxygen may be tried.

Tetra-Ethyl Lead.

A very active and dangerous poison, far more so than any inorganic Lead compound—only a few mgr. a day will cause cumulative poisoning. In the works of the Standard Oil Co., New Jersey, 5 employees died and 30 others were affected. For treatment large quantities of alkalis recommended.—B.M.J. i./28,61,64,75. Further investigation necessary.—*Ibid.*, 363,366.

In a family car using 107 galls. of Ethyl Petrol (3·5 Gm. Lead to the gall. 75% of the lead went into the air and the rest into the car parts.—*Daily Mail* April 13, 1928.

Ethyl Petrol acquitted.—L. i./30,820. Report of proceedings of Committee of Enquiry.—B.M.J. i./28,770,871,1033,1073.

Tetramethyl Lead of comparatively low toxicity compared with other Lead compounds. M.L.D.'s of a number of organic Lead compounds given.—J. S. Buck and D. M. Kumro, Jl. Pharm. and Exp. Therap., Feb., '30,171.

For further details of Motor Spirits, see Vol. II.

Ligroin is the fraction distilling between 80 and 120° C.

Petroleum Benzine or **Benzoline** is the fraction between 60° and 90° C. with Sp. Gr. about 0·690. This is used for cleaning purposes. Distinguish from Benzene (Benzol), the product obtained from Coal Tar, *q.v.*

Petroleum Spirit. *Syn.* PETROLEUM ETHER. ***Used for heating cauteries.*** Has Sp. Gr. 0·67 to 0·7, and distils over below 60° C. C_5H_{12}=72·0936 principally.

Benzinum Purificatum U.S. is Purified Petroleum Benzine with Sp. Gr. 0·634 to 0·660 at 25° C. and B. pt. 35 to 80° C.

Benzine (preferably spelt Benzin) means Petroleum Benzin.

Petroleinum, P. Belg. IV. and **P. Jap.** have Sp. Gr. 0·64 to 0·67 with B. pt. 50° to 75° C. FR. CX. has with *Syn.* **Gazoline,** Sp. Gr. 0·65 to 0·67, and to distil over entirely below 85° C.

Petroleum Spirit.—With Sp. Gr. 0·640 contains always a large fraction boiling below 40° C., and with Sp. Gr. 0·700 contains a large amount distilling above 60° C.—Tyrer and Gosling, P.J. ii./12,157.

Pétrole léger. FR. CX. has Sp. Gr. about 0·6, and distils entirely below 50° C.

Amyl Hydride. *Syn.* PENTYL HYDRIDE ; PENTYLENE ; HYDRAMYL. Mainly C_5H_{12}=72·096. Obtained by the fractional distillation of Petroleum Spirit. Sp. Gr. 0·625 to 0·649, boiling point about 30° C. It is very inflammable ; applied locally, is not absorbed, but rapidly freezes the part by evaporation. **Rhigolene** is similar.

PELLETIERINA.

$C_8H_{15}NO$=141·125.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A mixture of alkaloids obtained from pomegranate stem and root bark, *Punica Granatum* (*B.P.* 1898), (' Granatum ' U.S.) (*Lythraceæ*), in minute shining white crystals. The alkaloids are at least four in number, their amount varies between 0·5 and 0·7%. In addition 20% Tannin. Granati Cortex (Root Bark). P. ITAL. has *Syn. Melograno.*

Fluidextractum Granati, U.S.

Average dose.—30 minims (**2 Cc.**). 1 = 1. A glycero-hydro-alcoholic extractive.

Pelletierine is β-2-piperidyl propaldehyde or in other words the aldehyde of Conine. Though a secondary base it does not react with Nitrous Acid. The alkaloids of Pomegranate root seem to be entirely racemic though originally believed to be optically active.—Hess and Eichel, Ber., 1917.

Pelletierinæ Sulphas, Punicine Sulphate. (Fr. Cx.).

$(C_8H_{15}NO)_2H_2SO_4 = 380{\cdot}3256$.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A brown syrupy liquid, freely soluble in water, sometimes as crystalline mass. As a remedy for tape-worm: 5 to 8 grains taken fasting, followed by a full dose of compound tincture of jalap; for 13 years, half the above dose, and for infants one-tenth.

Fr. Cx. provides complete method of manufacture from the pomegranate root bark. In the final stage of extraction the combined pelletierine and isopelletierine are present as sulphates in aqueous solution which on slow evaporation yield a 'crystalline residue' of the two salts. The mixture is called 'Pelletierine Sulphate' for short. The dose is usually **0·3 Gm.** with **0·4 Gm.** of Tannin and **2·5 Gm.** of Syrup. Max. single dose is **0·4 Gm.**

Pelletierinæ Tannas (**B.P. '14**).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A mixture of the Tannates of the Alkaloids in greyish powder only slightly soluble in water, but soluble about 1 in 80 of alcohol 90%. As a tæniafuge, 8 grains followed in 2 hours by an ounce of castor oil proved an effectual dose, causing neither colic nor headache.

The **Hydrobromide** with same dose is a brownish viscid liquid.

Granati Cortex.

Better results in tapeworm by passing into duodenum by Einhorn's catheter. 150 Gm. of powdered root bark infused for 12 hours in a litre of water, and boiled down to one half. Before use, warm to 100° F. and give three doses of 65 Cc., at half-hour intervals, followed by laxative, after which catheter is withdrawn. Only two failures in 19 cases.—L. ii./26,1354.

PEPSINUM.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) either with or immediately before or after meals, in a pill or cachet. It is not unpalatable sprinkled on meat like pepper.

The gastric juice of man is believed to contain several distinct digestive ferments, the chief being:—

a. Pepsin.—This changes protein (fibrin, albumen, etc.) into peptones in an acid medium, 0·2% of Hydrochloric Acid being the most advantageous. To this the medicinal pepsins owe their activity.

b. Curdling ferment, which curdles the casein of milk; this is very active in the stomach of the calf, and will permit of its being dried; it is contained in the preparations of rennet preserved with salt, known as:—

Essence of Rennet. *Syn.* **Liquor Seriparus,** Liquid Rennet.

Dissolve Sodium Chloride 40 in water 810, add Alcohol 190 and macerate Rennet (calf's stomach) 100 in the mixture for three days with frequent agitation, then filter.—N.F. Ph. Form. gives three other formulæ—one with Glycerin and Boric Acid as preservatives.

Rennet can clot 400,000 times its weight of Casein in Milk.—C.D. '19,543.

Rennin. Rennet Ferment in powder form. One grain dissolved in about ½ ounce of water will in an hour or two curdle a pint of milk under ordinary conditions. (To be kept at blood heat.)

Rennet Tablets are prepared and are of considerable convenience. One will curdle a quart of milk.

Pepsin may be used in cheese-making instead of rennet. It is impossible to detect any difference between cheese made with pepsin and that made with rennet. The pepsin solution is :

Sodium Chloride 2 lbs., Boric Acid 3 ozs., Water 1 gallon.

Dissolve by boiling, then cool to 104° F., and add Pepsin 13½ ozs.—C.D. ii./17,761.

Pepsin is a light yellowish brown or white powder, or in translucent grains or scales, prepared by drying under 100° F. the fresh mucous lining of the stomach of the pig, sheep, or calf. It has a faint, not disagreeable odour, is moderately soluble in water. Rubbed with water, it makes a glairy mixture. Pepsina Porci is generally preferred. Pepsin is supplied to dissolve 2,500 (*B.P.* '14), 3,000 (U.S.), and 5,000 times its weight of freshly coagulated and integrated white of egg.

For various other Assay methods, see Vol. II.

Incompatibility according to our experiments, depends to a great extent on concentration of the diluent fluid. A *small* quantity of electrolyte seems essential to enzyme action. Salts present *in quantity* hinder the enzyme. The following if present in strong proportion *prevent action* :—

Alcohol,	Copper Sulphate,	Potassium Salts (Chloride,
Alkalis,	Extract of Malt,	Bromide, Iodide),
Alum,	Magnesium Sulphate,	Sodium Chloride,
	Paraldehyde,	Hexamethylenetetramine.

Further details, see Vol. II.

Asbestos, as also Aluminium Hydroxide, has the power of removing Pepsin and other ferments from solutions. *cf.*, p. 139.

Flavoring.—Syl Lavandulæ, Syl Coriandri, or as Elixir Pepticus.

Soluble and Insoluble Pepsins (Commercial).

Insoluble Pepsins are of two kinds, one precipitated by salt, and one made directly from the selected membranes without digestion, but purified by washing in spirit. These require a small quantity of Hydrochloric Acid to effect solution in water.

Soluble Pepsin is made by self-digestion of the membranes and subsequent dialysis of the resulting Peptone, thus leaving the peptic power in a soluble and more isolated form. It is then dried on glass plates, being sold in scale or powder form.

Uses.—As a digestive, small doses, either in form of powder, or cachets, or one of the following preparations with or after meals are useful. The Tabellæ, masticated, are specially convenient.

In sprue and hill diarrhœa, Pepsin has given good results.

In vomiting due to utero-gestation, pepsin in dose of 7 to 8 grains has been advocated as of service.—Yeo.

Pepsin and Hydrochloric Acid given immediately after eating may inhibit carbohydrate digestion in the stomach. It should not be taken until from 30 to 45 minutes after eating.—Prof. Diner, Jl. A.M.A., per Pres., Feb., '20.

GASTRIC AND DUODENAL ULCERS (600 cases) cured by subcutaneous injections of a 1% Pepsin solution (freed from albumin by pressure filtering through clay and containing Phenol). Begin with 0·2 Cc. thrice daily or every other day, increasing by 0·1 Cc. to 0·5 Cc., repeating this for 12 injections, and then decreasing in the same way to 0·2 Cc. Injections said to be harmless and painless. Give Olive Oil before meals and Bismuth after meals. Avoid Belladonna and Sodium Bicarbonate, and give mixed diet.—K. Glaessner (Vienna), L. i./32,78.

Glycerinum Pepsini (*B.P.* '14).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water.

A solution of Pepsin 8% strength in Acidulated Glycerin and water. This is a very active solution. If made with good scale Pepsin keeps indefinitely.

Elixir Pepticus. *Dose.*—½ ounce after each meal.

Glycerin of Pepsin 8, Dilute Hydrochloric Acid 1, Aromatic Syrup to 32.

Liquor Pepticus (Benger's).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in a wineglassful of water with meals. An active solution of the ferments in weak alcohol.

Liquor Pepsini et Caffeinæ. *Martindale.*

Dose.—2 to 4 drachms in water after meals.

The above dose contains 5 to 10 grains of Pepsin with 1 to 2 grains of Caffeine. As a digestive and restorative. The presence of Caffeine is stated to increase the activity of Pepsin.

Ⓟ Elixir Pepsini Bismuthi et Strychninæ.

Dose.—1 drachm (=Pepsin ½ grain, Bismuth and Sodium Tartrate 2 grains, Strychnine $\frac{1}{64}$ grain).

The formula is provided in XIXth Edn., p. 663.

Tabellæ Pepsini. *Dose.*—1 or 2 with or after meals.

These have 3 grains of pepsin in each in combination with chocolate, they are palatable—a handy form of providing the digestive.

Tabellæ Pepsini et Bismuthi. *Dose.*—1 or 2 just before or with meals,—contain 3 grains bismuth oxynitrate added to the above.

Tablets of Pepsin, compressed, 3 grains (**0·2 Gm.**).

Tabellæ Pepsini et Caffeinæ.

Contain 3 grains Pepsin with 2 grains Caffeine. *Dose.*—1 to 2 after a meal. Digestive and tonic.

Vinum Pepsinæ.

Dose.—1 to 2 drachms with meals.

Pepsin 3, Diluted Hydrochloric Acid 3, Sherry to 60.

For sale without a Wine Licence in the U.K. Pepsin Wines must contain 1 *of Hydrochloric Acid* (*B.P.*) *in* 80 *of the total product.*

***Peptenzyme** (T.M. 229531).

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**) before or after meals and at bedtime. A preparation containing the enzymes which enter into the process of digestion. Suitable for varied types of indigestion.

***Peptenzyme Elixir.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**). Is also made, pleasantly flavoured.

Extractum Gastricum.

Dose.—1 to 2 drachms diluted with a little cold water.

An extract of the entire mucosa of the stomach. It presents the peptic enzymes and contains approx. 0·25% Hydrochloric Acid, loosely combined with protein, and 25% Glycerin as preservative.

PEPTONE.

Peptone is either in form of a brown paste or a whitish readily soluble powder.

Manufacture.—Prepared from meat (the proteins and albuminoids) peptonised either by acidulation and heat under pressure, or by artificial digestion with pepsin or trypsin, and freed from saline matter.

Meat products may be treated by allowing to stand at room temperature for 5 or 6 days with 5 times their bulk of 70% Sulphuric Acid. Water is added and the mixture cooled and neutralised with Barium Hydroxide, and the Peptone solution dried *in vacuo*. Phosphoric Acid may also be employed. Alternatively Casein or Gelatin are operated upon in alkaline solution, the last-mentioned by aid of Pancreatin.

Certain types of peptone have been extensively used in bronchial asthma by the process of immunisation with non-specific protein *vide infra*.

Peptonised Beef.

A chocolate-coloured paste, having a bitter taste and the odour of extract of beef; prepared by artificially digesting beef by means of acidified fresh gastric juice and concentrating the solution. It is sometimes added to beef tea, but is too unpleasantly bitter to be readily taken by patients. Enemata, *v. infra*.

Peptone F.E. VII. is manufactured by digesting 1 kilo of beef with 10 litres of water (containing 4 Gm. of hydrochloric acid per litre) with pepsin 10 Gm. for 8 hours at 50° with frequent shaking. Termination of reaction shown by absence of precipitate with nitric acid on adding to a little of the filtered liquid. Evaporate. 1 kilo yields 250 Gm. approximately.

In F.E. VIII directions are abbreviated. Peptone made with Pepsin and Tartaric Acid is employed in **Vinum Peptonæ.** F.E.: Peptone 5, Glycerin 5, Malaga 90 by weight. *Dose.*—1 tablespoonful (15 Gm.).

Peptonoids of Beef.

Lean Beef, finely minced, 8 ounces, Pancreatin 60 grains, Sodium Bicarbonate 60 grains, Water 1 pint. Digest 3 hours at 130° F. with constant stirring; neutralise with hydrochloric acid, boil, strain and press. As enema 1 ounce with normal saline 3 ounces, *p.r.n.*

The proprietary article, ✱**Carnrick's Liquid Peptonoids** (T.M. 479927 and 29585)—'Beef, Milk and Wheat' is a predigested food. *Dose.*—½ tablespoonful at intervals. May be dispensed by registered chemists without requiring a spirit licence to be taken out, providing it forms a constituent of a *bona-fide* medical prescription given by a duly qualified medical practitioner. Also applies to ✱**Panopepton** (T.M. 231581).—P.J. i./11,568.

Beef Peptone with Malt.

Dose.—2 to 4 drachms. A palatable nutrient.

PROTEIN THERAPY.

Skin Reactions.

It is possible to determine by skin reactions whether an asthmatic is sensitive to vegetable and animal proteins, and the subsequent treatment is by (1) segregating him from the offending protein, (2) by 'desensitising' him with the specific 'antigen,' or (3) 'desensitising' him with gradually increasing doses of 'non-specific' protein. The pioneer in introducing Cutaneous Tests was, we believe, I. C. Walker.

For Refs. to original papers, see Edn. XIX.

Skin Test Solutions.

Various workers speak of making the Test Solutions by 'Solution' in N/10 Sodium Hydrate—*i.e.*, maceration of the protein preparation

for a period of time in the alkali. Solutions supplied for the purpose, which we examined, appear to be *without* this alkaline solvent—*i.e.*, they are made by macerating the protein in water or saline. They contained no preservative. They should contain 0·5% Trikresol, with controls of a similar composition.

Test Solutions may be arranged in groups :—

Animal Proteins :—Various meats (beef, mutton, veal, chicken, game), fish, egg, milk, butter and cheese.

Furs and Feathers :—Horse, dog, cat, sheep, rabbit, chicken, goose, etc.
Cereals :—Wheat, barley, oats, rice, tapioca, sago, corn, rye.
Fruits :—Various.
Vegetables :—Various (potatoes, cabbage, etc.). *Fungi* :—Mushrooms.
Beverages :—Beer, wine, tea, coffee, cocoa.
Bacterial :—B. Coli, etc.
Moulds :—Aspergillus, Penicillium.
Pollens :—These, for use in Great Britain, should be of typical indigenous British grasses and trees rather than from plants indigenous abroad. (It is stated that grass pollens are similar in effect while the pollen of "flowers" differ.)

Pollen Ophthalmic Test Solutions are prepared of seven graduated strengths. The solution is dropped on the eyeball and a positive reaction is indicated by slight reddening of the eye.

Technique.—Cleanse the skin on the inner side of the forearm with Ether and place a drop of protein upon it. Scratch sufficiently to break the skin without producing bleeding. Do the same on another place on the forearm, using a drop of control fluid. A + reaction shows in a few seconds by a zone of hyperæmia spreading outwards—followed in 20 to 30 minutes by the production of a definite urticarial wheal, of at least ¼ inch in diameter with little or no effect at the control.

Asthmatics show sensitiveness only occasionally to a *particular* protein, hence the skin test is only reliable in a small percentage of cases.—W. Langdon Brown, B.M.J. ii./25,205.

Hay fever in U.S.A. is attributed to **Ragweed (Ragwort)** and pollens.—I. C. Walker, Jl. A.M.A., Sept. 20/782.

Asthma, hay fever, urticaria, angio-neurotic œdema, may be classed in the group of toxic idiopathies.

Hypersensitiveness may possibly be acquired, *e.g.*, by constant contact, as in bakers with flour proteins but it is improbable that the condition arises *de novo* from absorption of foreign protein *via* the subcutaneous tissues or a damaged mucous membrane.—Sir H. Rolleston, L. ii./21,281 ; B.M.J. ii./21,233.

In the majority of asthmatics the trouble is due to inhalation of dandruff from fur, feather or hair of domestic animals.—F. Coke, B.M.J. i./21,372 and 615. See also J. Freeman, Pr., Jan. '26,73 ; Mackenzie Wallis, B.M.J. ii./21,796.

This tendency to develop toxic symptoms is markedly hereditary. Idiosyncrasy towards more than one substance is the rule.—H. W. Barber, B.M.J. ii./21,554.

Not more than 50% of all cases give it. 130 test substances used at New York hospital. In asthma cases giving a negative protein cuti-reaction, bacteria play a prominent part. In skin tests the grass pollen reactions are greater than those of food proteins. Any *grass* pollen can be used for the test but the pollen

of each kind of flower is different. Some cases of epilepsy give definite + protein skin test.—J. Freeman, Mackenzie Wallis, Fran Coke (**Histamine** may possibly be concerned in production c asthma), A. E. Gow, and others, B.M.J. ii./21,196.

With a protein to which the patient is very sensitive, the blus from the original injury to the skin does not fade, but gradual spreads and deepens, and begins to irritate and smart. At oth times, the wheal is almost absent and a large area of redness is th chief sign of the reaction. This is only of value when the contr or other tests give no reaction at all. It may be delayed for 4 even 7 hours. Analysis of 270 cases.—A. Latham and F. Cok Pr., ii./22,121.

80% of asthmatics found to suffer from some form of **Allerg** Common moulds form allergens to which 50% of asthmatics a sensitive. 1 in 1,000,000 dilutions often have decided therapeut effect. Allergen-free chambers used in treatment.—W. Storm va Leeuwen, B.M.J. ii./27,344. While van Leeuwen finds that *A. fumigatus* which flourishes extensively in Kapok is one of the chi causes of asthma in Holland, where most mattresses are stuffed wit the material, F. Coke advises its use in pillows to replace feathers.— Leader, *ibid.*, 355. Strong support for van Leeuwen's work.—H Kennedy, *ibid.*, 517.

If a patient is sensitive to feathers alone he will be relieved of his asthm if put on **Kapok Bedding.** The house dust of patients' own houses used f desensitising patients. Reactions with proteins are extraordinarily specific.— F. Coke, B.M.J. ii./27,517.

Skin reaction helpful. A patient, emaciated and profoundly depresse highly sensitive to cereals, had same removed from his diet, with the dramat result of 16 lbs. gain in weight in a month.—W. Langdon Brown, B.M. ii./22,758. See also F. Coke, *ibid.* 760.

Asthma in childhood.—Of 50 patients, 40 were child asthmatics. Nine we positive to pollens, one to dog, one to cat and one to bacon.—A. Dingwa Fordyce, L. i./23,175.

The abstracts under Sensitisation in Asthma should also be co sulted.

Peptone Immunisation in Bronchial Asthma.

The treatment of bronchial asthma by immunisation with sma graded doses of Peptone has been employed with success.

To A. G. Auld is due the credit of introducing (in 1917) this metho of 'NON-SPECIFIC PROTEIN THERAPY.'—B.M.J. i./17,580; ii./1 49; i./20,567; i./21,696; i./22,835; i./25,448,762; ii./26,732 i./27,829; L. i./23,790.

Though Peptone acts as a non-specific desensitiser, it is by n means certain that a protein to which the patient is sensitive alwa acts specifically and not in the same manner as Peptone. In th method it is unnecessary to find the protein that is the antigen.

A satisfactory immunising process is characterised by a sligh leucocytosis, particularly *re* the large mononuclears, and by increa in hæmoglobin and red cells.—A. G. Auld, B.M.J. i /22,835.

To test a Peptone as to suitability for clinical use.

(*a*) Add an equal volume of saturated aqueous Ammonium Sulphate Solution to a 10% solution of the Peptone and stir with a glass rod. If satisfactory, a sticky precipitate, which adheres to the rod, comes down.

The sample should also respond to half-saturated Ammonium Sulphate—this precipitates the primary proteoses.

(*b*) Add to a few Cc. of a solution, in a test tube, two or three drops of strong Nitric Acid. A copious white precipitate is immediately produced, consisting of primary proteoses. On heating, the precipitate entirely dissolves, and re-appears on cooling.

Uses.—The treatment has been applied not only to asthma, but also to such of its congeners as hay fever, associated skin affections, angio-neurotic œdema, cyclic vomiting, periodic diarrhœa, and the migraine-epilepsy syndrome ; in short, to such conditions as exhibit an anaphylactic character or sensitisation.

Cases resisting treatment :—

Many of those with chronic bronchitis and developed emphysema, and cases presenting any degree of cyanosis, even without bronchitis ; also those in whom, apart from asthmatical paroxysms, a more or less oppressed condition of the respiration is practically never absent. Where there is a family history of asthma from childhood one may get benefit for two or three weeks and then bitter disappointment. In such, a mildly toxic dose has to be given. In difficult cases a mixture of Peptones sometimes succeeds best.—A. G. Auld, B.M.J. i./20,568. *See also Serum Peptone, p.* 664.

Technique.

Two distinct procedures have been evolved : (1) *Intravenous* ; (2) *Intramuscular.*

(1) *Intravenous Treatment.*

A 5% solution of Peptone, of a special type, is employed. It contains 85% Protein, 60% of which represents primary and secondary Proteoses in the proportion of 1 to 6, *i.e.*, there is a high content of the secondary bodies. The hydrolysis has not been carried to the Amino-acid stage. It does not contain substances irritant to the tissues on injection. Care is taken (*a*) to prevent the delicate albumoses being decomposed by excessive heat ; (*b*) to neutralise the solution ; (*c*) to determine the solution is sterile. Contamination may cause *grave* consequences. The solution is in effect a culture medium for bacteria in the event of chance contamination.

Peptone Sterules for Intravenous use, to comply with these requirements, in a series of 10 graded doses :—

First	Dose 0·3 Cc.	(5 minims).	Sixth	Dose 1·3 Cc.	(20 minims).
Second	,, 0·5 ,,	(8 ,,)	Seventh	,, 1·5 ,,	(25 ,,)
Third	,, 0·7 ,,	(11 ,,)	Eighth to Tenth	,, 1·5 ,,	(25 ,,)
Fourth	,, 0·9 ,,	(13½ ,,)			
Fifth	,, 1·1 ,,	(17½ ,,)			

Continuation Course (Intravenous) of Peptone Sterules.

In addition to the above, a set of six doses is arranged as follows :—Three doses each of 2 Cc. (30 minims) and 2·5 Cc. (40 minims).

The injection is given *slowly intravenously* in the arm, no after dressing being necessary. The doses are administered every fourth or fifth day. The dose must be varied in certain cases.

Shading-off Courses (Intravenous).

The procedure according to A. G. Auld (B.M.J. i./25,448) is safe.

Writing concerning the intravenous technique, this authority advises dosage up to the tenth dose as hitherto, and after the tenth dose cases are broadly divisible into three classes. In one class the patient is quite well, and usually expresses surprise at his condition ;; in another he is much better, but not yet quite well ; and in a third he may be but little better.

In the *first* class, two additional doses of 2 Cc., approx. may be given and then there is a shading off to complete the treatment with the following weekly dosage : 1·5 Cc., 1·2 Cc., 1·0 Cc., and 0·6 Cc. This completes the course.

In the *second*, if the patient is standing the Peptone well, the dose may be increased to 2 Cc. and 2·5 Cc., employing the **Continuation Course.** Then there is a *weekly* reduction to complete the treatment, namely, with a dosage of 2·2 Cc., 1·5 Cc. and 0·9 Cc. If, however, during the treatment the patient has an attack of asthma, reduce the dose considerably, say, to 1·5 Cc. Continue with this for two or three weeks and then reduce to 1 or 0·6 Cc.

In the *third* type of case Auld advises that Peptone, dissolved in the serum from the patient's blood, be injected intravenously. *Vide Serum-Peptone.*

Shading-off Courses for **Class I.** are arranged of six Sterules, containing 2 Cc., 1·5 Cc., 1·2 Cc., 1·0 Cc., 1·0 Cc., 0·6 Cc., and **Class II,** containing three Sterules, 2·2 Cc., 1·5 Cc., 0·9 Cc., are prepared.

(2) *Intramuscular Treatment.*

Peptone Sterules for Intramuscular use are made of 7½% strength in the same range of ten doses (0·3 to 1·5 Cc.) as also a **Continuation Course (Intramuscular)** of six doses, three of 2 Cc. and three of 2·5 Cc.

Dosage for children.—The 7½% solution is also used intramuscularly commencing with 0·3 Cc. (5 minims).

Intramuscular technique is as efficacious as the intravenous in the majority of adult cases.

Adrenalin which is acknowledged of utility in asthma has been used satisfactorily in conjunction with the Peptone treatment.

Serum Peptone.

The intravenous injection of Peptone dissolved in a serum obtained from the patient has given good results in cases where Peptone alone proved unsatisfactory.

Run 2 or 3 ounces of blood into a sterile 4-ounce glass tube, and allow to stand corked at room temperature till next day. Allow no food for 5 hours before bleeding, so that the serum is clear. Pipette off and add an Agar solution, made by mixing one part of Agar with 1,000 of Saline well boiled. One volume of this is shaken with 4 volumes of Serum, and the mixture incubated at 37° C. for an hour. Peptone Powder (Armour No. 2) is added, preferably in 2½ or 3%, increasing to 5%, and the mixture is incubated for a further hour. Phenol 0·5%, *vide infra*, mixed with about 15 minims of Saline is then added in two portions with shaking.

To a patient with quiescent asthma this solution is given in 1½ Cc. doses intravenously every 3, 4 or 5 days, increasing gradually to 3 or 4 Cc.—A. G. Auld, B.M.J. ii./26,732 ; i./27,829.

In preference, the blood should be obtained just prior to an attack.

The following is now advised : Incubate the Agar Serum for about 2 hours at 37° C. Then 4 Cc. of a 30% *Peptone Solution* mixed with 2½ minims of Phenol is added to each ounce of the Agar Serum.—B.M.J. i./28,171.

Chloroform *(3 or 4 drops) now employed as a preservative instead of Phenol, as giving a clear mixture for a considerable time.—A. G. Auld, B.M.J. i./29,991.*

Witte's Peptone.—This brand of Peptone is made at Rostock in Germany. It is much more toxic in effect. According to Auld (B.M.J. i./21,696) it contains too much primary proteose in relation to secondary (roughly 1 to 2), whilst in Armour's the proportion is 1 to 7.

Some cases of asthma and hay fever are remarkably sensitive to intravenous injection of Witte's Peptone. 0·2 Cc. of 2% solution caused vomiting: the patient's eyes became suffused, and in less than five minutes his back was covered with urticaria.—A. E. Gow, B.M.J. ii./21,237.

Histamine to extent of 0·00335 Gm. in 100 Gm. was found in Witte's Peptone. Its presence in Peptone is responsible for dyspnœa, flushing, etc., sometimes produced. It is useless in the immunizing process, if not actually harmful. Armour No. 2 Peptone never gives the Histamine effect. It may be safely given to young children. *Witte's* Peptone is best given with a weaker Peptone.

Physiological testing suggested. The dermal (scratch) test may give evidence as to the presence of Histamine in a strong Peptone solution. All individuals give a marked though varied response to extremely dilute Histamine solutions. Ergamine can be used as control. Preparations giving a large wheal are unsuited. Confirm by intravenous injection of a small dose.—A. G. Auld, B.M.J. i./21,698; i./22,835.

Anaphylactic asthma successfully treated with Witte's Peptone. Initially hypodermically 0·3 Cc. 2% solution, with sufficient Sodium Carbonate to suspend and neutralise it in Normal Saline, increased every fifth day by 0·2 Cc. up to sixth injection (1·3 Cc.), when symptoms disappeared; this dose repeated further three times and patient discharged cured.—I.M.G., June, '26,285.

The **M.L.D. of Witte's Peptone** is about 0·3 Gm. per kilo in the unanæsthetised dog.—E. G. Gross, Jl. Ph. and Exp. Ther., Mar., '27,359.

Anaphylactic shock (in the dog) in part due to specific effect on the hepatic veins. It causes an obstruction, probably the result of constriction.—J. P. Simonds and W. W. Brandes, Jl. Ph. and Exp. Ther., Feb., '29,170.

"Peptone Witte Special 30."

Stated to be less toxic than Witte's ordinary Peptone. Fatal dose 80—100 mgr. per 100 Gm. rat, against 40 mgr. Auld has used 5% solution, which produced no irritation subcutaneously or intramuscularly, and satisfactory intravenously, but the latter must be used rather cautiously. Results from Germany and elsewhere show that non-specific treatment may well replace specific, even if the allergen can be discovered. The proteose of the patient takes up the allergen and excretes it (Oriel), which alone is sufficient reason for injecting Peptone.—A. G. Auld, L. i./31,804.

For further note on Witte's Peptone see Peptone Sterules 10%, 10 Cc.

Sensitisation in asthma.—It is known that if an animal is injected with a dose of some foreign protein, *e.g.*, white of egg, normal horse serum, etc., and after a sufficient incubation period, a second injection of the same protein be given, profound symptoms will take place, leading even to death in a few minutes. Asthmatics, soon after being exposed to the article to which they are sensitive, have their eyes running, and asthma develops. Our knowledge of what actually happens between the first sensitising dose and the second, is a matter of theory. With regard to predisposing factors, tens of thousands of injections of antitoxic horse sera were given during the war, but, for various reasons, these did not induce sensitisation. Theories apart, man can become sensitive, just as animals. At least 40 deaths are recorded from the injection of horse sera in man, chiefly in asthmatics, who we reasonably suppose to have been horse-asthmatics.—A. Latham and F. Coke, Pr., Aug. 22/121. See also B.M.J. i./21,372.

Asthma begins far more frequently in babyhood or early childhood than at any other time, and the great majority of these cases are

sensitive to some protein. Compound Licorice Powder, holly, fac powders, silk, linseed, and Aspirin, were among the causes of sensitisa tion. In certain cases, Peptone given intravenously is valuable.— Frank Coke, B.M.J. i./27,955.

In children, where the attacks are of the clear-cut spasmodi kind, Peptone is particularly useful. It is of most use intravenously The initial dose should be small and carefully given, because th patient may be sensitive to the Peptone and have an attack of sick ness or more grave anaphylactic symptoms. More commonly when a large dose is being given the patient will immediately flush, fee uncomfortable, and be sick. Subsequent doses in such event mus be given into the muscle or subcutaneously. The value of Pepton when given in large doses to promote protein shock is not so certain nor so convenient for use as an intravenous dose of T.A.B. or th Mixed Coliform Vaccine. A course of Peptone usually consists o twelve doses given twice weekly, but there is no great harm, often great benefit, in giving the course for six months, the large dose being given at weekly intervals. Hundreds of injections given with no alarming results—with one exception.—Frank Coke, B.M.J i./28,468.

Treatment of asthmatic attacks in children is best made by Adrena lin solution 2 to 3 minims. Treatment of the tendency is more difficult and important and consists in regulating the patient's life diet, possible removal of adenoids and tonsils, and sometimes the us of a vaccine prepared from sputum obtained during an attack. A lengthy course of a mixture of small doses of Potassium Iodide with full doses of Belladonna or Stramonium and Arsenic of value.— R. Hutchison, B.M.J. i./27,783.

Asthma in children.—Peptone and like compounds not advisable as they may lead to dangerous results in very hypersensitive cases.—W. R. F. Collis L. ii./30,567.

Epilepsy.—Twenty cases of *haut mal* type (average age 18 years) Peptone intravenously arrested fits in 9 and lessened frequency in a further 6. (Bristol Royal Infirmary and Stoke Park Colony fo mental defectives.)—F. H. Edgeworth, B.M.J. ii./20,780. See also A. G. Auld, *ibid.* 840.

Intramuscular injections proved of great benefit in a man of 35 who had suffered from fits for 15 years. The first dose of Peptone brought improvement. The full course of injections was given, terminating with the Continuation Course. Should be tried in resistive cases.—G. R. Hull, Pr., Oct., 1922.

Peptone Sterules (1 and 2% strength, Intravenous), as an aid in Vaccine treatment.

In *Vaccine Therapy,* as an aid to overcome hypersensitiveness met with, especially in treating the arthritic group of infections, Peptone has been well spoken of.

A course of 10 injections intravenously is advised as follows :—

On the first day 0·1 Cc. of a 1% solution ; on the second day 0·2 Cc. of 2% solution ; on the third day 0·4 Cc. of 2% ; on the fifth day 0·8 Cc. of 2% ; on the seventh day 1·4 Cc. of 2%, and thereafter, at three or four days intervals, 1·8 Cc., two or three times. Having reached 1·4 Cc., a subcutaneous dose of

vaccine can be given at the same time. This may be rather larger than the one the patient was sensitive to before treatment. No reaction, it is stated, will occur.—H. Warren Crowe, B.M.J. i./23,1046.

Peptone recommended for anaphylaxis in vaccino-therapy by L. Moinson.—L. ii./29,1097.

Varied forms of chronic non-infectious diseases treated by the **Danysz method.**—subcutaneous injections of heterogeneous bacillary proteins—or by **Nolf's method**—intravenous injection of Peptone or heterogeneous injection of bacillary proteins. Gow used *B. Coli* or *B. Typhosus*, 25 mill. to 100 mill. killed bacilli, suspended in 10 Cc of normal saline, increasing in subsequent doses. Intravenous injection of 10% Peptone is efficacious, but decidedly more exciting to administer.—F. J. Sadler, L. i./22,929.

Peptone per os.

Dose.—7½ grains (**0·5 Gm.**) twice daily one hour before the two principal meals.

In view of the presence of Peptone practically constantly in the stomach or alimentary canal, the giving of Peptone *per os* looks like carrying coals to Newcastle.—A. G. Auld.

Migraine in dyspeptics, benefited by 7½ grains of Peptone *per os*, ¾ hour before the three chief meals.—Pagniez and Nast, L. ii./20,143.

Migraine successfully treated with Peptone, 1 grain twice daily.—B.M.J. i./30,1159.

In some epileptics small doses found of value.—R. L. Mackenzie Wallis and W. D. Nicol, L. i./23,741.

URTICARIA, has been treated with success. It is a manifestation of the anaphylactic state, French dermatologists advocate the ingestion of 0·5 Gm. Peptone one hour before each meal.—R. Hallam, B.M.J. ii./28,880.

Abstracts from literature on Non-Specific Protein Therapy.

1. PEPTONE.

Pyrogenic Therapy. (**'Protein Shock'** of American workers.) A full pyrogenic reaction, *viz.*, good rigor, high pyrexia, body pains, profuse sweating and usually sickness and diarrhœa are often salutory. Amenable to the treatment are arthritis, neuritis and neuralgia, certain skin affections and subacute or chronic inflammatory exudations.—A. G. Auld, B.M.J. ii./21,822.

Pyrotherapy for G.P. I. with ***Typhoid Vaccine, see Typhoid.***

SCIENTIFIC BASIS OF NON-SPECIFIC PROTEIN THERAPY.—In many cases non-specific vaccines and serums although empiric are as active as the specific. Peptone (intravenously) gives a less violent reaction than vaccines. The common active principle is, no doubt, a product of protein decomposition. The toxic effect of Witte's Peptone is well known, but so-called peptone poisoning is produced by proteoses and albumoses, and proteins when broken down completely to peptones have little toxicity. Witte's Peptone produces, on heating with acid or alkaline Alcohol, **Vasodilatin.** 1 Gm. yielded 0·3 Gm. of this, and the minimum lethal dose of the peptone was 4 mgr. per Gm. of mouse, while the minimum lethal dose of Vasodilatin was 0·1 mgr. per Gm. **Histamine** in Witte's Peptone is not more than 3 mgr. per 100 Gm. It is practically non-toxic. With regard to the blood changes effected by the method, there is no doubt that these protein cleavage products have a strong lymphagogue action, and produce increased permeability of the capillaries, especially in the liver and in the skin. Non-specific Protein Therapy causes a washing out of the tissue fluids into the blood, causing a number of changes in its composition. The evidence at present is insufficient to show which of these changes is really of chief clinical importance.—A. J. Clark, B.M.J. i./23,315.

Eleven out of 20 bronchial asthma patients 'more or less' improved with intravenous injections of a 5% solution, the doses increasing from 0·5 to 3 or 4 Cc. The writer agrees with Dr. Auld that the intervals of recurrence of the attacks become less frequent after Peptone Therapy.—P. Boot, 'The Treatment of Bronchial Asthma by Intravenous Injections of Peptone,' Review, L. i./26,6.

In British East Africa bronchial asthma (which is very common) has been treated intramuscularly, commencing with 2 Cc. doses, at intervals of 5 or 6 days. Smaller doses were found practically useless for adults. In all these cases (of 6 months to 5 years' standing) beneficial results were obtained, improvement being usually noted after the third injection.—E. F., June, '26.

CHRONIC CASES OF URTICARIA, SEBORRHŒA, SEBORRHŒIC ECZEMAS, DERMATITIS DUE TO IRRITANTS, AND CHRONIC SKIN CONDITIONS generally, where the patient is sensitised, are affections in which excellent results were obtained using 'Sterules' Peptone 5%, injected intravenously. It is essential to use a reliable brand of Peptone and one that is Histamine-free. In acute conditions the intramuscular injection of 5 Cc. of the patient's blood giving a further injection of 10 Cc. five days later, and continuing with this quantity at intervals of 5 days, seemed to give good results. The reduction of the *p*H value of the urine (if it is to be hyperacid) to normal by means of an alkaline mixture is also advocated.—H. R. B. Hull, Jl. R.N.M.S., April, '26,147.

In ***military medical practice*** the method of value in cases of local densitisation such as seborrhœic dermatitis that has been scratched and infected with a skin staphylococcus, and of general sensitisation such as urticaria. The graduated doses are 'fool proof' and an overdose in a highly sensitive patient is impossible. They have a remarkable effect on most cases of asthma.—Jl. R.A.M.C., Nov., '26,400.

MIGRAINE.—In the treatment of migraine, resistant to the commoner methods, some cases (7 out of 20) showed marked improvement after 8 to 10 injections of a 5% solution, from 5 to 25 minims being injected at a time, each dose being increased by 5 minims.—L. ii./27,241.

DERMATITIS HERPETIFORMIS.—Peptone *subcutaneously* said to have given good results in a few cases.—Jl. A.M.A. ii./25,631.

ARTHRITIS.—Good results in rheumatic or fibrositic conditions and toxæmic states, *e.g.*, urticaria. Contraindications, marked debility, tuberculosis, diabetes and advanced cardio-vascular disease. Primary dose, 0·4 Gm. of Peptone for a man, 0·3 Gm. for woman, intragluteally with injections at 5 or 6 day intervals of twice preceding dose. Three or four injections usually effected cure. Dosage regulated to obtain reaction temperature of about 101° F.—E. Bulmer, Edin. Med. Jl., per B.M.J.E. i./25,8.

Rheumatoid arthritis showed marked improvement from use of Peptone.—J. Eason, L. ii./26,1065.

Arthritis deformans treated with peptone intramuscularly, 0·2 Gm. dose weekly.—Goodall, B.M.J. i./23,512.

DIARRHŒA HÆMOPTYSIS.—Often rapidly effective in. Pyrexia should never follow.—B.M.J.E. i./26,3.

COLITIS AND HÆMOPTYSIS.—Favourable results with Peptone. Excellent effect in asthma confirmed.—H. Pollitzer, per Jl. A.M.A. ii./25,2001.

In ANTHRAX, intramuscular injection of Peptone 3% in doses of 30 Cc. daily in 43 cases. The results were as good as those obtained when a normal or specific serum was used.—R. F. Vaccarezza and co-workers, per T.D.B. 19/22,897.

PNEUMONIA, SUBSEQUENT TO OPERATIONS INVOLVING THE UPPER ABDOMEN, thought to be anaphylactic in origin, the protein shock coming from the intestines. Desensitisation before the operation with Peptone 0·3 Gm. in Normal Saline 2 Cc. is now carried out when time permits in all abdominal sections and no case which has had Peptone has developed pneumonia.—M. Dixon, B.M.J. ii./27,985.

2. OTHER AGENTS.

Chronic Arthritis.—T.A.B. Vaccine intravenously produces rapid improvement in 80—90% of cases, which is maintained in between 50—60%, the types responding best being acute and subacute,

where disease is confined to the periarticular tissues. Injections of no use unless all possible foci of infection removed. Reactions severe, but contraindications few—disease of myocardium, gross kidney disease, chronic alcoholism, tuberculosis and syphilis being the chief. Cases of the menopause group of the chronic villous type and those showing achylia do not do well. Initial dose 100 mill. (in private practice 50 mill.), increased at each subsequent dose by 100 mill., 4 days elapsing between injections. Dosage should be regulated to produce rigor, sharp rise of temperature, quick fall, and profuse perspiration. Of 50 cases treated 44 were discharged after 4 weeks as definitely improved.—W. Yeoman, L. i./26,1246-50 ; see also Leader, 1265.

In a small percentage of cases miraculous results with non-specific agents, either protein or preparations of B. typhosus. More might be done to search for that part of the protein molecule that is therapeutically active.—A. Goodall, L. ii./26,1065.

The results in rheumatoid arthritis from Typhoid vaccine intravenously may be as much attributable to stirring-up of focus of infection as to stimulation of the defensive mechanism of the body, and the ultimate factor in determining cure may be the response to the antigenic activity of the infecting organism, this response being evoked not directly but indirectly by the protein injected. —E. M. Dunlop, B.M.J. ii./24,1110.

In addition to injection of proteins, *e.g.*, proteose preparations and bacterial vaccines, which are efficacious in cases of arthritis, including rheumatoid arthritis, other measures for producing non-specific effects have been employed, *e.g.*, the artificial abscess following ***subcutaneous injection*** of ***Turpentine,*** and even artificial interposition of another infection. There is justification on the laboratory side. In pigeons, a relative immunity to B. avisepticus has resulted from injection of B. coli, vaccine.—T. J. Mackie, B.M.J. i./25, 91.

Fibrositis—a large proportion of cures and improvement by protein shock therapy, using a combination of toxin and bacterial protein.—G. Paul, L. ii./25,711.

Articular rheumatism (300 cases) treated by massive doses of Sodium Salicylate, 10 Gm. increased by 2 Gm. daily to 18 Gm., and Sodium Bicarbonate 20 Gm. increased to 36 Gm., combined with shock induced by Colloidal Silver injection, Peptone or Milk. Large quantities of water taken.—Brux. Med., June 14, '25. Per Pres., Feb., '26,77.

See also Colon B. Vaccine and Therap. Index.

SCIATICA of the sacro-iliac joint: T.A.B. vaccine intravenously gives the best chance of removal of symptoms in the shortest possible time.—W. Yeoman, L. ii./28,1119.

Asthma.

True cases of bronchial asthma benefited by prolonged injections of P.T.O. dilutions, beginning with 0·5 Cc. of 1 in 1,000,000 and gradually increasing. The treatment must be kept up for a year at least and injections twice a week are given for the first 4 months, then once a week for 4 months, and lastly once a fortnight.—T. Nelson, Pr., June, '27,382.

Tuberculin in treatment of asthma acts merely by virtue of its Protein content.—L. Hofbaver, W. Klin. Woch., Dec. 3, '25,1311. Pres., '26,158.

MALTA FEVER.—Protein Therapy a useful adjuvant in the treatment of.—Per. Jl. A.M.A. ii./25,1999.

GASTRIC AND DUODENAL ULCER has been treated by protein therapy. Disappearance or reduction in 29 out of 51 cases.—V. Gromer, Med. Klin., June, '26,991, per Pres., Jan., '27,19.

Histologic study of the ulcers did not reveal any curative effect from Protein Therapy on peptic ulcers.—Per Jl. A.M.A. ii./25,1013.

DIABETES MELLITUS well treated by Protein Therapy.—B.M.J.E. i./26,25.

Recent References to Protein Therapy in General.

Asthma, hay fever, eczema, urticaria, angio-neurotic œdema and migraine appear to be intimately correlated and interchangeable.—G. W. Bray, B.M.J i./30,387.

Treatment by desensitisation, though still empirical, has given very good results in some cases.—L. ii./31,1140.

It is an undeniable fact that a small injection of animal protein in high dilution has very marked effect on the spasmodic attack associated with asthma.—T. Nelson and A. D. Porter, L. ii./31,1344.

Asthma due to protein sensitiveness (dog). Opinion divided as to Peptone.—C. J. Murphy, L. i./31,813. Asthma well treated.—J. Mowbray, L. i./31,813.

Urinary Proteose.

Proteose in the urine excreted in anaphylactic and allied conditions. The substance gives the Biuret reaction. It is not coagulated by heat, but by Lead Acetate : nor by half-saturated Ammon. Sulph., but is by full saturation. Gave intradermal reactions in dilution 1/100,000 in horse sensitives. The proteose contains the antigen to which the patient was sensitised. Used in urticaria, etc.—G. H. Oriel and H. W. Barber, L. ii./30,231.

Injections of autogenous urinary proteose incredibly specific in conditions such as chronic urticaria, angio-neurotic œdema, eczema, prurigo, dermatitis herpetiformis and psoriasis. Only infinitesimal doses necessary, *e.g.*, 0·025 to 0·1 Cc. of a dilution of 1 in 10 million, or even 1 in 100 million. Having found the dose on which patient improves progressively decrease rather than increase it.—H. W. Barber, L. ii./31,1267.

'Specificity' questioned. Chief peculiarity not specificity, but property of producing intense local inflammatory reaction in certain individuals, the significance must be interpreted cautiously.—R. M. Lyon, G. H. Percival and C. P. Stewart, B.M.J. i./32,136.

Anaphylaxis.

Several cases of sudden death following injection of foreign protein, *e.g.*, serum, pollen, etc., have occurred in the past 5 years. A study of.—R. W. Lamson, Jl. A.M.A. ii./29,1778.

For treatment of hay fever with Pollen Extracts see **Hay Fever.**

Peptone Ointment.—In abscesses of the sweat glands and bartholinitis, an Ointment of Peptone 10, Distilled Water 10, Lanolin 20, Vaseline 60, has been successfully used.—M. 1931, Pt. II.,297.

Milk Injection. Sterilised.

Dose.—5 to 10 Cc. intramuscularly but much smaller doses have been used in certain affections.

Milk Sterules 5 and 10 Cc. are made.

(The milk in preference should be freed from the bulk of its fat.)

The gonococcus cannot resist a high temperature. It has been observed that if an intercurrent febrile disease arises whilst a patient is suffering from gonorrhœa or an acute epididymitis complicates the case, the urethral discharge may cease without returning. Schmidt and Saxyl reported in 1916 that protein reactions could be produced by milk injections. Hence these injections which have the power of raising body temperature might have effect on the gonococcus.

The method was tried in acute and subacute stages of gonorrhœa, injections into the gluteal muscles of sterilised milk in 5 Cc. doses, 10 Cc. into each buttock being given. Chill, general malaise and rise in temperature followed ; normal in 24 hours. Dangers nil and results good.—M. W. Browdy, L. i./23,874.

ACUTE GONORRHŒA treated with milk injections combined with local treatment. Initial dose 4 Cc., increased by 2 Cc. Duration of treatment shortened.—B.M.J.E. ii./24,86.

Milk injections in gynæcology.—B.M.J.E. i./25,13.

INFANTILE CONVULSIONS treated with milk injections. After giving 10 minims into the child's thigh the effect was magical. ? Anaphylaxis the actual cause of the fits, and whether the injection of milk desensitised the infant. Also found successful in diarrhœa.—W. A. Wilson-Smith; B. P. Sabawala, B.M.J. i./23,238.

Subcutaneous injections of milk in infants.—B.M.J.E. i./26,30.

INTERSTITIAL KERATITIS well treated with combined treatment of Neosalvarsan (intravenously) and milk (intramuscularly).—Van Lint, per Pres., Feb., '23,73.

ERYSIPELAS and EYE AFFECTIONS have been treated by Milk injections.

ERYSIPELAS.—Rapid recovery in 15 cases following intragluteal injection of 5 Cc. Contraindications: pulmonary tuberculosis and chronic recurrent hematemesis.—B.M.J.E. i./28,85.

G.P.I.—Milk Therapy considered superior to anti-syphilitic treatment. Injections of 10 Cc. of sterilised milk under the skin of the abdominal wall. 40 cases of G.P.I., many of chorea, and several of epilepsy treated by this method in Budapest.—L. i./24,1231.

LEPROSY well treated by intravenous Milk injections. 12 cases treated with sufficiently good results to enable them to resume their employment. The treatment is drastic and dangerous and especially applicable to the late and more hopeless forms of the disease.—N. A. Dyce Sharp, Trans. Roy. Soc. Trop. Med., Jan., '28,308.

LOBAR PNEUMONIA.—Injections of 10 Cc. of milk repeated once or twice. Of 23 cases treated 6 died.—H. R. Eichelbaum, U.F.C., '25,205.

PHENOLPHTHALEINUM.

B.P. '14, U.S., Ph. Ital. V., P.G. VI., P. Belg. IV., F.E. VIII.

Syn. ✱PURGEN (T.M. 243986 and 286636 Assoc.), ✱LAXOIN (T.M. 253802), DIHYDROXYPHTHALOPHENON.

$$C_6H_4<\begin{matrix}C(C_6H_4.OH)_2\\ CO\end{matrix}>O = 318{\cdot}1092.$$

Dose (*B.P.* '14).—2 to 5 grains (**0·12 to 0·3 Gm.**), but larger doses are used. To be given in preference in fine powder *e.g.* in Slipule (No. 1 for 3 grains) or as effervescent.

A crystalline substance M.pt. 250 to 253° C. made by interaction of Phenol and Phthalic Anhydride. Soluble 1 in 10 of alcohol 90%, but only 1 in 600 of water.

Pharmacology.

Phenolphthalein is dissolved in the bile and alkali in the intestine, and being now slightly irritant to the intestine, causes peristalsis. It is partly absorbed and excreted by the liver, and so acts again and again in the intestine—it acts hence for a few days as a mild aperient.—D. Grieve, P.J. ii./21,490.

Uses.—As a purgative. Ordinarily ½ to 3 grains is sufficient, but patients confined to bed require from 3 to 10 grains. Does not irritate the kidneys. It is satisfactory for prompt action, as in jaundice. It is more active than Cascara and less griping, and has been found ideal in intestinal toxæmia.

Skin eruptions from Phenolphthalein in U.S.A.—B.M.J.E. i./22,81. Pres., May, '22,182; July, 246; B.M.J.E. i./23,81; Clin. Jl., Dec. 19/23,611.

Capable of destroying red blood corpuscles and inducing toxic degeneration of the kidneys, cases cited.—Per Pres., Jan., '23,15.

We have never come across any of these bad effects.

Phenolphthalein Tablets, $\frac{1}{2}$, 2, and 4 grains are made.

Under the name "Purgen," is supplied as "Infants" containing Purgen $\frac{3}{4}$ grain, "Adults' Purgen" $1\frac{1}{2}$ grain, and "Strong Purgen" $7\frac{1}{2}$ grains.

Ⓟ**Tablets Phenolphthalein Compound.**

Phenolphthalein 1 grain, Strychnine Hydrochloride $\frac{1}{250}$ grain, Belladonna Extract (*B.P.* '14), $\frac{1}{100}$ grain. These weigh $2\frac{1}{2}$ grains (**0·15 Gm.**). A useful combination.

Tabellæ Phenolphthalein with Chocolate Basis are made $\frac{1}{2}$, 2 and 4 grains, also **Tabellæ Phenolphthalein** (4 grains) **cum Extracto Rhei** (3 grains).

Effervescent Phenolphthalein.

Dose.—One to two teaspoonsful in half a tumbler of warm water a good half hour before breakfast. Contains 3 grains per drachm. A satisfactory mild laxative taken first thing in the morning.

✱**Feen-a-mint** (T.M. 493257, 440391, 524533). A laxative preparation for constipation, containing Phenolphthalein with Gum basis for chewing.

Phenolsulphone-phthalein. 'Phenol Red' U.S. X.

Dose.—(By injection) $\frac{1}{10}$ grain (**0·006 Gm.**). Employed as a test for permeability of the kidney. *See Vol. II.*

Testing of ampoules with Phenol Red.—J. Pritchard, P.J. i./30,539.

Fluorescein.—Tetraoxyphthalophenon Anhydride.

Resorcin-phthalein Anhydride. $C_{20}H_{12}O_5 = 332{\cdot}0936$.

In yellowish red powder, *sparingly* ***soluble*** in water, more so in presence of an alkali, *e.g.*, Sodium Hydroxide, forming **Sodium Fluorescein** showing a green fluorescence.

Sodium Fluorescein. *Syn.* URANIN, OBTURIN.

Red crystalline powder, readily soluble in water, forming a red solution with intense greenish-yellow fluorescence.

Activated (irradiated) Fluorescein in treatment of cancer.

Slightly alkaline (not neutral) solution of Sodium Fluorescein sprayed or painted widely over the surface of the growth, followed by Radium or X-Ray irradiation of moderate penetration.

Oral use.—Capsules of Sodium Fluorescein 1 Gm. (in 2 capsules). to 3 Gm., half an hour before treatment, or as a 'swallow'—Sodium Fluorescein 5, Sodium Bicarbonate 3, Glycerin 2, Water to 100—for growths in pharynx, etc., when it is impossible to spray (actually 1 drachm has been given in error for 1 Gm. without unpleasant symptoms.) Feeling of sickness in some cases. It is excreted by the kidneys.

Paint.—Sodium Fluorescein 2·5, Sodium Bicarbonate 3, Glycerin 2, in Distilled Water 100.

Intravenous Injection.—For lung cases. Sodium Fluorescein 5, Sodium Bicarbonate 3, in Normal Saline 100. Inject 20 Cc. slowly, *e.g.*, in 3 minutes. "**Sterules**" containing 20 Cc. are made. Treat immediately after injection.

Nodule Injection.—Same as for Paint.

Bladder Injection.—Sodium Fluorescein 2·5, Potassium Fluorescein 2·5, Sodium Bicarbonate 3, in Normal Saline 100. Leave for 10 minutes and then remove, leaving about 4 ounces.

Enema.—Same as bladder injection. Decant as much as possible. Too strong concentration of Fluorescein may cause X-Ray erythema.

X-rays.—Dosage, 6H : filter 4 mm. Aluminium ; spark-gap (between points) 7 inches ; kilovoltage 110 ; milliampèrage 4. Time taken 10 to 15 minutes. 3 weekly doses given followed by 3 weeks' rest. Cycle repeated for 6 months and then occasionally up to a year or longer.

120 cases treated at Royal Northern Hospital between 1927 and Nov., 1930—33 died and apparently 23 recovered (alive and well Nov., 1930). Other hospitals and private reports in addition. Allied dyes also investigated.—S. Monckton Copeman, B.M.J. i./31,658.

See also Franco-Brit. Med. Review, Oct., 1930 : Jl. of State Medicine, Vol. XXXVI, No. 11, p. 642 : Claude Gouldesbrough, B.M.J. i./31,767.

The external application causes no pain, and there are no unpleasant symptoms from the internal use, except yellow coloration of the skin, which disappears.—S. Monckton Copeman, B.M.J. ii./28,223.

Rapidly growing, *i.e.*, more malignant, growths responded particularly. In breast cancers, enlarged glands in the axilla disappeared under Fluorescein *per os*, although not themselves directly activated. In superficial secondary growths, *e.g.*, recurrent nodules on or near the scar of an operation wound, good results were obtained by injecting with a needle a few drops of Fluorescein solution into the substance of the nodule prior to irradiation. Treated in this way, secondary nodules, even of considerable size, may disappear with unexpected rapidity. Cases previously regarded as inoperable were, in certain instances, after activated Fluorescein, found, at a comparatively early stage, to have undergone such changes as to render them amenable to surgical intervention with satisfactory results.—S. M. Copeman, Frank Coke and C. Gouldesbrough, B.M.J. ii./29,233.

Criticism.—J. H. Douglas-Webster, B.M.J. ii./29,367,983 ; S. M. Copeman, *ibid.* 929.

Effect of Activated Fluorescein on growing beans.—Results suggest that the intensifying action of Activated Fluorescein on X-Rays is negligible.—S. B. Wigoder, B.M.J. ii./30,643. In reply, S. Monckton Copeman points out that the summary is somewhat obscure in view of the fact that Fluorescein would only be 'activated' when irradiated. The fluorescent property of the drug is greatly enhanced by being definitely alkaline—in this may be the cause of absence of success in some instances in treatment of cancer. A fairly soft ray is necessary.—B.M.J. ii./30,709.

Uranin may be used as proof of death by injection. There is no reaction in case of death but if death is only apparent, the integument and the eyes turn green in a few minutes.—P.J. ii./11,436.

Differentiation of meningitis from other diseases with meningitis symptoms. Sodium Fluorescein *per os*. *Dose.*—0·025 Gm. per kilo for infants and 0·05 Gm. per kilo for older persons.—B. E. Bonar and L. G. Bailey, Am. Jl. Dis. Child., per P.J. ii./30,411.

Liquor Fluoresceinæ, R.O.H. Fluorescein 8 grains and Sodium Bicarbonate 12 grains in 1 ounce. Useful to diagnose corneal lesions. The ulcers and parts denuded of epithelium take a green colour, which persists for 2 or 3 hours. Loss of substanee in con junctiva is denoted by a yellow coloration.

Ophthalmic 'Sterules' of Fluorescein solution are cleanly in use.

The **Rhodamines** have remarkable tinctorial power—the red dye class, as 'G extra' especially. The colour in a milligram of a solution containi[ng] 0·000,000,000,0001 Gm. is discernible.—L. i./13,184.

A representative of the group of Rhodamines is:

$$HOOC\,.\,C_6H_4\,,\,C\begin{matrix}-C_6H_3N\diagdown(C_2H_5)_2\\ \quad >O\\ C_6H_3=N(C_2H_5)_2Cl\end{matrix}$$

which is obtained by heating for seve[ral] hours at 200° C. one molecule of Phthalic Anhydride with two molecul[es] Diethyl-m-amido-phenol.

Fluorescent substances may play a defensive role in the skin, and an opposi[te] one in the blood stream.—P. Redington Peacock, B.M.J. ii./25,584.

Isamine Blue.

A Sulphonated-naphthylated Pararosaniline of high molecular weig[ht] stated to be non-toxic. Investigations of its value in cancer have been co[n]ducted, using a 0·8% aqueous solution and a 5% solution in Glycerin. I[ts] persistent staining of body tissues is an objection to its use and results sho[w] no superiority over Activated Fluorescein (*antea*).—S. Monckton Copema[n] Jan., 1931.

Distinct and maintained improvement in 10 out of 18 cases of maligna[nt] tumours. First day, 5 Cc. 1% Eosin; 2nd to 8th day, 10 Cc., then 2 day[s] rest, followed on 11th day by 5 Cc. 0·5% Isamine Blue with 1% Glycerin, an[d] on the 12th day 10 Cc. Isamine Blue and 2 Cc. Glycerin, followed by 6 dail[y] doses of 20 Cc. Isamine Blue and 4 Cc. Glycerin. All injections given intra[-]venously.—Bernhardt, per Pres., Feb., '31,75.

Induction of inflammation in treatment of malignant and other local disease[s.] **Isamine Blue** intravenously or intraperitoneally sometimes stains grafte[d] tumours in rats. Inflamed tissues accumulate this dye, Trypan Blue an[d] others.—H. Burrows, L. ii./29,603.

Sodium Tetraiodophenolphthalein.

Syn. 'IODO-RAY,' TETIOTHALEIN SODIUM, IODEIKON, ✱OPACI[N] (T.M. 478,478), ✱CHOLUMBRIN (T.M. 481,225), PILIOPHEN, 'T.I.P.'

(This, and the parent acidic substance were mentioned under th[e] names ANTINOSIN and NOSOPHEN in E.P. IX (1898), with ½ Gm. doses.)

$$COONa.C_6H_4.C\begin{matrix}\diagup C_6H_2I_2=O\\ \diagdown C_6H_2I_2.ONa\end{matrix}=865{\cdot}7844.$$

(It is of interest to compare the above formula with that of the corre[-]sponding Di- Sodium Salt of Phenolphthalein.

$$COONa.C_6H_4.C<\begin{matrix}C_6H_4=O\\ C_6H_4.ONa.\end{matrix}$$

to indicate the position of the Iodine atoms, distinguishing from Sodiu[m] Phenol-tetraiodophthalein, described later.)

Chemical Characters.

A blue-coloured powder, somewhat hygroscopic, with slightl[y] aromatic taste, readily soluble in distilled water and almost in[-]soluble in Alcohol. An aqueous solution may throw out on standing[,] owing to absorption of Carbon Dioxide and deposition of the acidi[c] body. On the addition of Hydrochloric Acid to a solution th[e] cream-coloured Tetraiodophenolphthalein is precipitated.

Assay.

The Iodine content may be ascertained by fusion with Chloride-free Soda lime, adding Sulphurous Acid, dissolving in Nitric Acid, adding excess of Silve[r] Nitrate and back-titrating the uncombined Silver with Ammonium Sulpho[-]cyanide. The compound should contain not less than 53%. Theory is 58.6%.

Sodium Content (Alkalinity).

In the author's laboratory the percentage of free and combined alkali is determined by adding excess of standard acid, heating to expel CO_2 and then titrating back with N/10 Sodium Hydroxide to a pale blue colour. The sulphated ash yield is a good control. Theory for total Sodium is 5·31%.

Toxicity.

The compound should have a tolerated intravenous dose for animals of 0·25 Gm. per kilo as mentioned by Graham and others. A higher dose causes toxic symptoms.

From animal experiments which we have had conducted we find it is not possible to draw conclusions from results with *mice*. Larger animals, *e.g.*, *rabbits*, give more reliable data.

N.B.—Further, 250 mg. per kilo intravenously can *NOT* be read as equivalent to 16 Gm. for a 10-stone man. On the contrary, one could reckon—using Meeh's Formula—4 Gm. approx. intravenously as the limit dose.

We had the above toxicity confirmed (1926) with a sample specially made. Immediate death occurred with 260 mg. per kilo in rabbits. Our criticism would be that the dose *needed* for a shadow is rather near the lethal dose. In addition, one might assume with reason that man would be more sensitive than the rabbit.

An investigation by the Pharmacopœia Commission on 7 commercial samples showed little variation—0·37 mgr. per Gm. weight of mouse for the least and 0·27 mgr. per Gm. for the most toxic sample. The conclusion was that the compound from makers of good repute should show no important divergence of toxicity.—J. Barba-Gose, Qtrly. Jl. Ph., '29,396 ; L. i./30,522.

Uses.—The compound is not advised for intravenous use.

This compound has been submitted to extensive trials as diagnostic of cholecystic disease by the method of X-Ray visualisation known as **Cholecystography.**

It has been advocated as the most suitable of numerous chemicals which, following intravenous or *per os* administration, are excreted by the liver into the gall-bladder, rendering it opaque.

The method was originated by the work of Graham and others in the U.S.A., and was discussed at numerous meetings here, *e.g.*, at the International Congress of Radiology held in London on July 1, 1925. (See a paper by R. D. Carman on work at the Mayo Clinic, L. ii./25,67).

Iodine having a heavier atomic weight than Bromine it is expected the compound containing this halogen would yield a better shadow than the analogous Tetrabromphenolphthalein, other things being equal. The latter is not used now.

ORAL USE.

Dose of 'Iodo-Ray' *per os* for an adult.—A total of 3 to 5 Gm. usually suffices, based on a figure of 0·04 to 0·07 Gm. per kilo.

This dose may be given either (*a*) in the form of '**Stearettes**' or other medicament coated so as to pass through the stomach and dissolve promptly on reaching the alkalinity of the duodenum, thus obviating vomiting, or (*b*) in '**Slipules**' (plain uncoated capsules), with the possibility of vomiting following.

Technique of Administration.

'Stearettes' and 'Slipules' are prepared containing 0·5 Gm. each (10 giving 5 Gm.) and 0·3 Gm. (16 giving 4·8 Gm.). The former are used in preference, as fewer are needed to obtain the total dose Slipules—containing 1 Gm. are also made.

Large draughts of water are often given with the substance.

The 'Stearettes' or 'Slipules' one or more at a time at 10 to 15 minutes intervals, are taken either during the evening meal or within

two or three hours after. If given about 6 p.m., it should be possible to get good X-Ray pictures the next morning.

The following procedure has given satisfaction:—The patient is given a fat-containing meal. (Fat is given in order to empty the gall-bladder.) Two hours afterwards, the patient being in bed, 10 of the 'Slipules' (0·5 Gm. each) are taken, two every ¼ hour. During and after the taking of the 'Slipules' the patient is to lie on his right side. No food should be given during the period of the X-Ray examinations and no breakfast should be taken the following morning.

Oral Administration in One Dose.

This is the acidic form of the compound and may be prepared by admixture of 4.25% Citric Acid. The dose is therefore a suspension of the white acid body which reverts to the blue soluble Sodium salt in the intestinal canal, to collect in the gall-bladder, as generally known.

The author manufactures the one dose type under the name '**Iodo Ray.**'—**Single Dose.**

Similar preparations are ✱**Opacol** (T.M. 499708), **Iodeikon** and **Shadocol.**

The position of the gall-bladder shadow and the rate of its emptying varies with the type of bodily habitus. Only very mild toxic symptoms (such as slight epigastric discomfort) were exhibited in a very few of 100 students in whom the method of diagnosis was tried. Five 1 Gm. capsules dipped in Stearic Acid were given for a dose, during the evening meal, a fair quantity of water being taken. A radiogram was taken 14½ hours later, without breakfast, and then 2 hours after with fatty meal, and 16 hours after taking the capsules a second radiogram is taken. With a current of 30 m.a. the distance of the tube from the individual should be 36 inches, exposure 4 to 6 seconds, and spark gap 5 inches. The tube is centred over a point a hand's-breadth to the right of the spine of the second lumbar vertebra and the radiogram is taken with the abdomen towards the film at the end of inspiration. Certain normal individuals who fail to give a shadow on the first investigation may on a second investigation give a positive result. Thus a negative cholecystogram, in the absence of clinical evidence, is less reliable than positive cholecystographic evidence of disease.—F. Davies, B.M.J. i./27,1138.

Intolerance.—Vomiting, nausea and purgation may be experienced. The vomiting has been eliminated by the injection of a little Adrenalin solution. Atropine has also been given prophylactically.

Period at which X-Ray Pictures are taken.

Three X-Ray examinations are usually necessary between 10 and 24 hours after taking the Iodo-compound, the best pictures being generally obtained at about 16 hours. The shadow of a normal bladder is seen well defined at the 12*th hour*, it is increased at the 15th, and there is diminution in size and density at the 20th hour.

A 5-inch spark gap may be used, the tube being kept a good distance away (F. Melville).

References to Oral Use.

A correct diagnosis obtained in 95% of 467 patients.—E. V. Graham and co-workers, Jl. A.M.A. ii./25,953.

In the majority of cases the gall-bladder can be seen clearly after oral use, which produced less frequent and less severe toxic symptoms.—A. F. Hurst, B.M.J. ii./25,1151.

Diagnosis, treatment and prevention of gall-stones. The salt is absorbed into the portal circulation and excreted in the bile. It then reaches the gall-bladder, the mucous membrane of which absorbs water from the bile and so leads to its gradual concentration, until about 12 hours after the pills are swallowed a shadow can be seen—a good account. As to treatment, biliary antiseptics, *e.g.*, Urotropine, large dose, even up to 300 grains a day.—A. F. Hurst, B.M.J. ii./26,677 ; L. i./26,966.

(See also Hexamine—its action as biliary antiseptic.)

Oral method employed almost exclusively at Middlesex Hospital. Variations in the strength of gastric and pancreatic juices causes trouble in perfecting a capsule coating. Possibility of local damage due to extravasation a serious drawback to intravenous use. *Technique.*—The patient is prepared as for an ordinary skiagram of the gall-bladder. An ounce of Castor Oil is given one night and ½ ounce the next. Light breakfast and a very light lunch are permitted on the following day, and an ordinary skiagram of the gall-bladder is taken in the afternoon. Tea and bread and butter are permitted on the same day and another small meal at 12 p.m., during which the drug is swallowed in the form of capsules. The dose given is 5 Gm. (4 Gm. if the patient weighs under 100 lbs.), administered in ½ Gm. capsules. A cup of tea only is given on the following morning and X-Ray examinations at 10 a.m., 2.30 p.m. and 4.30 p.m.—T. Izod Bennett and co-workers, L. ii./26,20 ; B.M.J. ii./26,195,681.

Oral use is quite accurate enough for routine. Ill-effects insufficient to cause alarm.—J. H. Anderson (Ruthin), B.M.J. ii./26,682.

Oral use (Iodo-Ray ' Slipules ') gave correct diagnosis in 92% of 100 consecutive cases. A faint shadow of gall-bladder after giving the dye once does not warrant diagnosis of a pathological gall-bladder. Early cases of Cholecystitis may give normal shadows. Occasionally a normal gall-bladder may fail to give a shadow.—P. G. McEvedy and J. E. Sheret, L. i./27,1120.

Except for 8 complaints of nausea and one case of vomiting, 125 patients were quite unaffected by the drug. The diagnosis was confirmed in 94·3% of cases.—J. H. Mather and W. R. Williams, B.M.J. i./27,614.

Use *per os* here better than in U.S.A.—L. ii./27,982.

Oral use in the Mayo Clinic good—may well be repeated in doubtful cases. Only a few patients need be submitted to the more uncomfortable and dangerous intravenous method.—G. B. Eusterman, Jl. A.M.A. i./28,197.

Combined Cholecystography and Barium Test Meal an invaluable diagnostic aid in female patients presenting the cholecysto-duodenal syndrome.—D. P. D. Wilkie, L. ii./27,1228.

Unpleasant effects from oral use eliminated by mixing the salt with white of egg and then adding to cooked cream of wheat (about 4 ounces). Films as good as by other oral methods.—H. Morris, B.M.J. i./28,305.

Death coincident with oral use in a man of 62. The relation of the taking of the compound to the onset of acute hepatic degeneration found *p.m.* could not be stated.—G. E. Dyas and S. C. Dyke, Brit. Jl. Radiol., March, '28.

Functions of the biliary passage in relation to their pathology. The paper deals, *inter alia*, with anatomic functions of the bile-ducts, effect of removal of the gall-bladder, gall stones, biliary stasis, biliary trouble in pregnancy, relation of biliary effects to pancreatic disease.—D. P. D. Wilkie, L. ii./26,689.

Expulsion of the contents of the gall-bladder in response to fat feeding is a ***vital function*** of its musculature and is independent of mechanical factors. General conditions influencing smooth muscle tonus ***must be considered*** in interpreting the motor phase of any cholecystographic series.—W. J. M. Scott and L. R. Whitaker, Jl. A.M.A. ii./28,9.

Value now questioned. No rules can be followed. Good roentgenologic technique needed. Resumé of errors in technique.—L. R. Whitaker, Jl. A.M.A. ii./28,141.

Administered orally to dogs, even in massive doses, produced ***no degenerative*** or necrotic ***changes in the liver*** or ***kidneys.***—Jl. A.M.A. ii./27,196.

In dilutions up to 1 in 100,000 has marked bacteriostatic action on staphylococci and streptococci, but only slight action on colon bacilli. In the higher

concentrations it is definitely germicidal and may have therapeutic value in some types of cholecystitis.—A. C. Nickel, Jl. Ph. and Exp. Ther., Nov., '29,365.

Absence of any shadow is the surest sign of disease.—L. ii./29,400.

Shadocol causes little nausea or diarrhœa: after absorption from the intestines the dye is excreted by the liver into the bile and reaches the gall-bladder by way of the cystic duct. In the gall-bladder water is absorbed and the dye becomes concentrated so as to be opaque for X-Rays. There are numerous factors mitigating against efficacy, so that probably not more than 50 to 60% of diagnoses are correct.—T. C. Hunt, L. ii./29,755.

When it is remembered that the dye is excreted into the bile and the bile containing it is concentrated to a marked degree by the ***normally-functioning gall-bladder,*** it will be realised that in this country, where the dye is ***nearly always given per os,*** the shadow forming shows it is being adequately absorbed from the intestine, that it is being normally secreted by the liver, that the liver secretions are passing freely into the gall-bladder, and that the gall-bladder is adequately concentrating the bile. Too many gall-bladders are being operated upon simply because of absence of a shadow—(we agree.—W. H. M.).—A. J. Walton, L. i./30,338.

Duodenal tube method of giving.—Satisfactory results.

For References, see Edn. XIX, p. 682.

Sodium Bromide *per os* has also been given, *q.v.*

The di-Iodo compound of Atophan, *Syn.* ✱**Biloptin** (T.M. 474564) has been suggested for use in cholecystography instead of the Phenolphthalein compounds.—Pres., Oct., '27,383.

Intravenous Use.

Many authorities are of the opinion that this technique should not be employed as a routine method. The injection into the blood stream of a concentrated (10% or more) solution of a Phenolic body of this kind, containing 58·6% of Iodine, in the massive dose of 5 Gm., as has been advocated, is a procedure which cannot possibly be undertaken without a grave element of risk. There is the probability that the substance is in part decomposed by the labile Carbon Dioxide present, resulting in thrombosis. It is not a definite crystalline compound, *e.g.*, like Sodium Iodide—on the contrary, it is liable to variation according to technique in manufacture.

Furthermore, any slight decomposition following storage of the chemical in the dry form, through the action of the atmospheric Carbon Dioxide, is negligible in the case of oral use, but the same is not true from the aspect of a compound to be injected into the blood stream unless the solution is filtered just before use. In brief, if the surgical operation of an injection can be replaced by a simple *per os* diagnostic that procedure should be the method of choice from the aspect both of the patient and the radiologist.

We are also inclined to think that intolerance in some cases must have actually been due to abnormality of the patient. Certain results of which we have knowledge would otherwise be entirely incapable of explanation.

Analogy with a solution of Sodium Carbolate.—W.H.M., B.M.J. ii./26,620.

Technique of intravenous use.

The quantities are modified by some.

For a patient of 115 to 160 lbs. (52 to 72½ kilos) 3 Gm. is dissolved in 24 Cc. or 3·5 Gm. in 28 Cc.—the most recent accounts advise 40 Cc. as the volume of water. For patients of less weight reduce

the dose. The dose is given (in two injections at an interval of ½ hour) first thing in the morning. Breakfast is omitted. At noon a glass of milk is taken, and the evening meal as usual. Water *per os* is allowed at all times.

Transitory fall in blood pressure.—0·5 to 1 Cc. of Adrenalin solution intramuscularly has been used to relieve this.

For a large number of Abstracts on Intravenous Use, see Edn. XIX., pp. 683-685.

Bismuth Tetraiodophenolphthalein, *Syn.* EUDOXIN.

Dose.—5 to 8 grains (**0·3 to 0·5 Gm.**).

A reddish brown powder insoluble in water given in stomach and intestinal affections.

Phenoltetrachlorphthalein as liver function test, and the *Bromsulphalein Test* are dealt with in *Vol. II.*

Sodium Tetrabromphenolphthalein. *Syn.* BROMO-RAY, BROMEIKON.

$$COONa.C_6H_4.C\begin{cases} C_6H_2Br_2=O. \\ C_6H_2Br_2ONa. \end{cases} = 677{\cdot}7214$$

Dose.—The dose *per os* is from 4 to 7 Gm., according to weight of the patient, the average dose being about 5 Gm. It is given as '**Slipules**' containing ½ to 1 Gm. during the evening meal, frequent draughts of water being taken. The 'Slipules' are preferably given two or three at a time at short intervals.

This compound is a pale mauve powder readily soluble in distilled water. Both the powder and solutions should be preserved from the action of the air, as Carbon Dioxide is slowly absorbed, Solutions can be sterilised by heating in a boiling water-bath.

X-Ray pictures are taken at 12, 15 and 20 hours.—R. D. Carman, L. ii./25,67.

'***Iodo-Ray***' *v. antea* is more generally used.

Further data on Intravenous Use, etc., see Edn. XIX., pp. 686, 687.

PHOSPHORUS.

P=31·02.

Ⓟ*In Irish Free State and Northern Ireland: Phosphorus and all preparations (and admixtures, Northern Ireland) containing it in a free state.*

Dose.—$\frac{1}{100}$ to $\frac{1}{20}$ grain (**0·0006 to 0·003 Gm.**). Max. single dose (*B.P.*'14) $\frac{1}{25}$ grain, FR. CX. $\frac{1}{64}$ grain. Max. during 24 hours $\frac{1}{32}$ grain.

Phosphorus is obtained by converting Calcium Phosphate (of bones) into the soluble Superphosphate by heating with Sulphuric Acid: this is reduced to metaphosphate by heating with charcoal and finally by further heat is converted into normal Calcium Phosphate with evolution of vaporised Phosphorus.

A poisonous, non-metallic element melting at 110° F., igniting at a slightly greater heat, and forming white fumes of phosphoric anhydride.

German Shells contained Phosphorus, yellow and red.—B.M.J. i./15,259. Capable of producing localised gangrene and anaerobic bacterial infection; more barbarous than expanding bullets. We had occasion to examine a shell of this kind ourselves—it contained the red variety.

Antidotes.—Give Copper Sulphate 3 grains every five minutes (see Antidotes to Poisons), or Hydrogen Peroxide ½ drachm in 1 ounce of water, repeated every 15 minutes. Potassium Permanganate 1% solution *per os* is also good chemically, or Magnesium Sulphate ½ ounce. Give demulcents. Previously French Oil of Turpentine was advised, but Oils in general are unsuited.

Inject normal saline solution and give alkalis as soon as the vomiting and purging subside.

Matches.—The use of Yellow Phosphorus is prohibited in Great Britain, Germany, etc. "Strike-anywhere" matches usually contain Tetraphosphorus Trisulphide.

Safety Matches contain an oxidising mixture (Potassium Chlorate, Manganese Dioxide, Lead Peroxide PbO_2, etc.) on the match and Red Phosphorus on the box.

Necrosis of jaw bone caused by work in PHOSPHORUS MATCH WORKS. There are two types known as phosphorisme (anæmia, albuminuria and fragility of bones) and 'Phossy jaw.' Scarlet Phosphorus sets up acute structural changes in the brain.—Sir T. Oliver, B.M.J. ii./21,111.

Phosphorus necrosis, in consequence of the introduction of the Sesquisulphide method of making matches, has entirely disappeared.—Sir Thos. Oliver, Industrial Legislation and Hygiene, B.M.J. ii./25,530.

Soluble about 1 in 320 of absolute alcohol, about 1 in 200 of ether, about 1 in 25 of chloroform, about 1 in 100 each of oleic acid, almond, olive, castor, theobroma oil, and suet; in half its weight of carbon bisulphide, almost insoluble in water; combines chemically with oils of turpentine and peppermint, forming non-luminous and comparatively non-poisonous liquids.

Uses.—Phosphorus has been given as a nervine stimulant in various affections of the central nervous system and in neuralgia; and in leucocythæmia, and some skin diseases.

There is, however, no evidence that the central nervous system is ever in a condition of phosphorus starvation. The evidence that phosphorus retention is increased by giving organic and inorganically combined phosphorus is conflicting.

N.B.—Preparations should be recently made and kept from light.

Elixir Phosphori.

Add Compound Tincture of Phosphorus 1, to Glycerin 4.

Dose.—15 to 60 minims (**1 to 4 Cc.**) in water. Contains $\frac{1}{50}$ grain in one drachm A palatable well tolerated 'fluid' form of Phosphorus.

Oleum Phosphoratum (*B.P.* '14). P. Belg. IV.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), on sugar or in perles.

Contains about 1% (by weight) of Phosphorus in prepared almond oil. (*B.P.* '14 is flavoured with Lemon Oil.). P. Ital. V. is 0·1% in Olive Oil.

Flavoring.—Emulsified and Glyl Rosæ added, taste is covered, but more usually given in **Perles** or **Pills.**

ORIENTAL SORE.

Best results in old intractable cases with extensive ulceration, the oil being dabbed on after removing the scab, every other day. When ulcerative process not well developed and lesion is nodular, inject 3 to 5 m. hypodermically round or into nodule once or twice weekly ; injection practically painless. No general reaction and local reaction slight, but signs of acute inflammation occasionally develop. The delayed action of Phosphorus on the liver should be kept in mind.—A. Castellani, Jl. Trop. Med., Nov. 2, '25,377. See also *ibid.* June 1, '23,194.

RICKETS and OSTEOMALACIA and certain cases of very chronic MALARIAL CACHEXIA : In these as an adjuvant to Quinine and Arsenic, a dilute preparation of ½ m. Phosphorated Oil in 5 m. diluent is used.—B.M.J. i./23,283.

Phosphorus Solutus P.G. VI.

Dose.—Max. single 3 minims (**0·2 Cc.**) : *pro die* 10 minims (**0·6 Cc.**).

Heat Liquid Paraffin 194 by weight 10 minutes at 150° C. Cool to about 60° C. and dissolve Phosphorus 1 (cleaned from external layer and free from water) by shaking in a stoppered bottle. Allow to cool and add Ether 5 by weight. *Oleum Phosphoratum P. Svec.* X is Phosphorus 1, Liquid Paraffin 94, Ether 5.

Perles of Phosphorus. Contain $\frac{1}{100}$, $\frac{1}{65}$, and $\frac{1}{32}$ grain.

Pilula Phosphori (*Martindale*).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Phosphorus 1 and Oil of Theobroma *q.s.* to 100.

Heat the oil to 150° C. and sustain the heat for 5 minutes. Strain and weigh 99 into a wide-necked bottle with an india-rubber cork, and when cooled to 65° C. add the Phosphorus, cork and shake well till the fat begins to solidify. In rolling it into pills, divide into suitable lots, and beat each in a mortar to render it plastic before applying it to the machine, then work off quickly and cover with sandarach solution. The mass contains 1% of Phosphorus in perfect solution. A few drops of chloroform added during manipulation checks oxidation. When phosphorus is to be combined with other ingredients in a pill, the following is best used :—

Sevum Phosphoratum, 10%. (*Martindale*).

Phosphorus 1, Pure Carbon Bisulphide 5. Dissolve and add Prepared Mutton Suet 9. (**Sevum Præparatum**, is the purified internal fat of the sheep, M. pt. 45 to 50° C., prepared by melting and straining. **Sevum Benzoatum** is the same digested with 3% Benzoin at 60° C. *B.P.* '14.)

Add a little of the suet at first, mix quickly, add the remainder, mix thoroughly and allow the bisulphide to evaporate. May be used to make the following pills. They are perfectly stable as there is no interaction or decomposition.

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Ferro** (3 grains).

Phosphorated Suet 10 grains, Reduced Iron 150 grains, Compound Tragacanth Powder 10 grains, Chloroform 15 minims. Mix, and add quickly, Mucilage of Acacia *q.s.*

Divide into 50 pills (or into 750 pills if the quantities be taken in grammes). Cover with Sandarach Solution. They are also made with Ⓟ**Nux Vomica** ($\frac{1}{3}$ grain).

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Quinina** (1 grain).

Phosphorated Suet 10 grains, Quinine (base) 38 grains (= 50 grains Sulphate), Chloroform 20 minims. Mix quickly, and add Compound Tragacanth Powder 10 grains, Mucilage of Acacia *q.s.* Mix, and divide into 50 pills (or into 750 pills if the quantities be taken in grammes). These pills are also made with **Reduced Iron** 3 grains, and with **Reduced Iron** (3 grains) and ℙ1 **Strychnine** ($\frac{1}{40}$ grain).

ℙ1 **Pilula Phosphori** ($\frac{1}{50}$ grain) **cum Strychnina** ($\frac{1}{40}$ grain). Prepare as Pilula Phosphori cum Quinina, with Strychnine $1\frac{1}{4}$ grains *vice* Quinine 37 grains. These are also made with **Reduced Iron** (3 grains).

Dose.—Any of the above pills are best taken directly after meals.

No exception is taken to pharmacists making the Phosphorus preparations herein mentioned, according to the formulas of the late W. Martindale, but in other instances in the book rights are reserved.—W. H. M.

Tinctura Phosphori Composita. *Formula devised by W. Martindale, 1st Edn. E.P.* 1883. *Dose.*—3 to 12 drops on sugar.

Phosphorus 1, Chloroform 85. Warm gently in a stoppered bottle till dissolved, and add the solution to Absolute Alcohol to 500. Shake well and keep in the dark. Becomes acid on keeping.

Phosphorus Pentachloride. $PCl_5 = 208{\cdot}34$. ***Manufacture.***—Pass chlorine *q.s.* into a cooled solution of phosphorus 1 in carbon disulphide 4 until a portion removed no longer gives phosphorescent residue when evaporated on paper. Then remove the carbon disulphide by filtration with aid of reduced pressure, *e.g.*, water pump. A yellowish white crystalline mass fuming in moist air, employed chemically in numerous reactions, for example, substitution of hydroxyl groups with chlorine.

Zinci Phosphidum, $Zn_3P_2 = 258{\cdot}15$.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) in **Pill.** Fr. Cx.—Max. single dose $\frac{1}{8}$ grain; Max. during 24 hours $\frac{1}{4}$ grain approx.

A grey powder. With acids yields phosphoretted hydrogen.

Phosphorus determination in vermin killers.—Y.B.P., 1919,124.

Acidum Hypophosphorosum, U.S. X. $H_3PO_2 = 66{\cdot}0434$.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

A colourless liquid, strength 30 to 32%. Latter has Sp. Gr. 1·136.

On heating, water evaporates and the acid decomposes at 130° to 140° C., forming hydrogen phosphide, which ignites, and phosphorous acid. The latter decomposes at 160° to 170° C. into hydrogen phosphide and phosphoric acid; finally the last portions of unoxidised phosphorus burn out at a higher temperature (U.S.).

Hypophosphites. There is no reliable evidence that they exert a physiological effect or influence any pathological process.—Jl. Am. Med. Assn., per P.J. i./16,247.

Acidum Hypophosphorosum Dilutum.

Average dose.—8 minims. 10% strength. Sp. Gr. 1·042 at 25° C. This strength is termed Acidum Hypophosphorosum in F.E. VIII.

Uses.—Its Salts are mostly employed. It may be added to Syrup of Ferrous Iodide to preserve same.

Ammonii Hypophosphis. $NH_4.H_2PO_2$=83·0748.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

In white deliquescent tabular crystals, soluble 5 in 6 of water. Insoluble in alcohol. It has a nauseous saline taste. ***Incompatible*** like the Calcium Salt. Nervine tonic.

Calcii Hypophosphis. $Ca(H_2PO_2)_2$=170·1532.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White crystalline salt, with nauseous taste, soluble 1 in 7 of water. Prepared by heating phosphorus with milk of lime until phosphoretted hydrogen ceases to be given off, then filter and evaporate to crystallise or precipitate with alcohol.

Incompatible with oxidising agents.

Uses.—Nervine tonic and aphrodisiac. Checks night sweats of phthisis, and is used in acne. In epilepsy has proved serviceable.

Mistura Calcii Hypophosphitis.

Calcium Hypophosphite 5 grains, Saccharated Lime Solution 1 drachm, Peppermint Water to 1 ounce.

Barii Hypophosphis. $Ba(H_2PO_2)_2$=267·4412.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

White crystalline salt soluble in water $3\frac{1}{2}$. Prepared in manner analogous to the above and its properties are similar.

Ferri Hypophosphis. $Fe(H_2PO_2)_3$=250·9468.

Syn. FERRIC HYPOPHOSPHITE.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) in a pill.

In commerce is a whitish amorphous powder with a chalybeate taste slightly soluble in water, but more so in presence of Potassium Citrate.

Liquor Ferri Hypophosphitis Fortis, B.P.C.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Uses.—Tonic in anæmia, neurasthenia and disturbed nutrition.

℞ **Pilula Ferri Hypophosphitis cum Strychnina.** Strychnine $\frac{1}{30}$ grain, Ferrous Hypophosphite 2 grains. To make one pill (or in grammes to make 15). *Dose.*—1 twice or thrice daily.

Magnesii Hypophosphis—$Mg(H_2PO_2)_2,6H_2O$ = 262·4848.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). White crystalline salt soluble in water, about 1 in $4\frac{1}{2}$.

Potassii Hypophosphis, KH_2PO_2=104·1316.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

A deliquescent granular white powder, having a nauseous, bitter taste. Soluble 1 in 1 of water. Incompatible as the Calcium Salt.

Flavoring.—Syl Aurantii Floris; Glyl Rosæ, Elixir Simplex

Sodii Hypophosphis (*B.P.*'14). NaH_2PO_2=88·0326(+H_2O Ph.Ned.V.)

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

A white granular deliquescent salt, with a bitter, nauseous taste. Soluble 1 in 0·63 of water, and freely soluble in alcohol. Explosive with an equal weight of Sodium Nitrate. See also Calcium Salt.

Uses.—In phthisis, and as nutrient in wasting diseases generally.

Flavoring.—Syl Sassafras, Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aromaticus.

Ⓟ**Syrupus Hypophosphitum Compositus,** U.S. VIII.

Average dose.—2 drachms (8 Cc.).

Ferric and Manganese Hypophosphite, of each 2·25, with Sodium Citrate 3·75 are first dissolved in water 30, then Calcium 35, Potassium 17·5, and Sodium Hypophosphites 17·5 are dissolved in water 400, with Diluted Hypophosphorus Acid 5. Quinine (base) 1·1 and Strychnine (base) 0·115, with Hypophosphorus Acid 10 are then dissolved in water 30. Finally, Sugar 775 is dissolved in the mixed solutions and made up to 1,000 with water. Chloroform 1 in 500 added we find improves its keeping qualities. It contains approximately $\frac{1}{120}$ grain of Strychnine Hypophosphite in a drachm.

In phthisis and like cases, hypophosphites raise the nervous power and improve condition of the secretions. They are given in sufficiently large doses for at least 6 months.

Ⓟ**Tablets of Compound Hypophosphites** each weighing 2 and 4 grains and equivalent to ½ and 1 drachm of the above are prepared.

Ⓟ✱**Fellows' Compound Syrup of Hypophosphites** (T. M. 20267) is stated to contain in 100 Gm., Potassium, Manganese and Calcium Hypophosphites each 1·2 Gm., Iron Hypophosphite 1·4 Gm., Quinine Hypophosphite 1·0 Gm. Strychnine Hypophosphite 0·02 Gm.

Dose.—Medium adult, 1 drachm. Children in proportion.

Ⓟ**Pulvis Hypophosphitum Compositus.** *Dose.*—1 to 4 grains (0.06 to 0·25 Gm.).

Calcium Hypophosphite 37½, Sodium Hypophosphite 20, Manganese Hypophosphite 2½, Quinine Hypophosphite 1½, Strychnine Hydrochloride Trituration *q.v.* 1⅓, Iron Hypophosphite 2½, Milk Sugar to 100. Five grains = $\frac{1}{150}$ grain Strychnine Hydrochloride, approx., *i.e.*, 1 drachm of the U.S. VIII Syrup.

Ⓟ**Glycerol Hypophosphitum, Glycerol of Hypophosphites.**

Dose.—1 drachm (4 Cc.). A sugar-free tonic.

Dissolve Calcium Hypophosphite 160 grains, Manganese Hypophosphite 80 grains, Potassium Hypophosphite 160 grains, Quinine Hypophosphite 80 grains, Strychnine Hypophosphite 2½ grains in Distilled Water 3 ounces, and add Strong Solution of Ferric Hypophosphite (B.P.C.) 4 ounces, Hypophosphorus Acid 2 drachms, Glycerin to produce 20 ounces. Each drachm contains Strychnine Hypophosphite $\frac{1}{64}$ grain and Quinine Hypophosphite ½ grain.

Care must be taken to distinguish the above preparations which contain strychnine from the following preparation, which contains none:—

Syrupus Hypophosphitum U.S.IX had Hypophosphite of Calcium 45, of Potassium 15, of Sodium 15 with diluted Hypophosphorus Acid 2, Sugar 600, Glycerin 50, Water *q.s.* to 1,000. *Average dose.*—2½ drachms.

PHYSOSTIGMATIS SEMINA.

Calabar Bean (*B.P.* 1898). *Syn.* ORDEAL BEANS, from West Africa.

Dose, in powder.—1 to 4 grains.

History of introduction of the drug.—Gordon Sharp, P.J. 1./16,619.

The poisonous properties of the ripe seed of *Physostigma venenosum* (*Leguminosæ*) are chiefly due to Physostigmine, which is contained in the cotyledons only, the content being about 0·25%.

Details of other constituents: *Edn. XVII*, *p.* 640.

Antidotes.—Emetics, Atropine or Belladonna, Chloral, Strychnine, Tannin. Potassium Permanganate 10 grains in 1 pint of tepid water, by stomach tube, repeated in ½ hour. Stimulants freely.

Therapeutic doses of Physostigmine are incompatible with thos of Atropine and Hyoscine and observations on man and animal suggest that large therapeutic doses of Atropine or Hyoscine ar

capable of preventing death from Eserine. A fatal intramuscular dose of Physostigmine Salicylate in the cat is stated to be 0·001 Gm. per kilo.—S. Weiss, Jl. Ph. & Exp. Ther., Apl. '26,188.

Uses of Physostigma.—Causes increased peristalsis with liquid motions and excessive urination. Sweating and salivation are effected, the pulse frequency is lessened and blood pressure increased. Preparations of Physostigma and solutions of its alkaloid Physostigmine $\frac{1}{4}$ to 1%, applied topically to the eye, contract the pupil, and are antagonistic to atropine.

As a myotic the solution acts in 5 to 15 minutes and the pupils remain contracted for 12 hours. It is employed to overcome the over-dilatation caused by Atropine, Homatropine and Cocaine.—G. Sharp, P.J. i./16,619.

Traumatic tetanus has been well treated with extract $\frac{1}{8}$ grain every hour then $\frac{1}{2}$ grain every 2 hours; or give Physostigmine hypodermically, and increase every hour, so as to paralyse, little short of arresting, the breathing. For chorea also it is given in smaller doses. In paralysis it arrests muscular wasting and improves muscular power. In hemiplegia or paraplegia give doses of $\frac{1}{30}$ to $\frac{1}{10}$ grain of extract frequently.—R.

℗ **Extractum Physostigmatis** (*B.P.* 1898).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

An alcoholic extract containing three-fourths of its weight of milk sugar. Yield about 2 to 5%.

℗ **Tinctura Physostigmatis** B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Calabar Bean, in No. 40 powder, 1, Alcohol 90% *q.s.* to 5.

It is antagonistic to strychnine, but is *not* to be depended on as a remedy for poisoning by nux vomica or strychnine.

ℙ 1 **Physostigmina.** *Syn.* Eserine.

$C_{15}H_{21}N_3O_2$=275·1878.

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain (**0·0006 to 0·0013 Gm.**).

In colourless crystals, slightly soluble in water, freely in ether, soluble 1 in 180 of vaseline. Solution in castor oil, $\frac{1}{2}$ to 1% (by weight), keeps well for ophthalmic use.

Myotic activity of Eserine mainly due to the Urethane group on the molecule. —E. Stedman, Biochem. Jl., Vol. XX, No. 4, 719.

℗ **Unguentum Physostigminæ, R.O.H.**

Physostigmine 1 grain, Soft Paraffin to 1 ounce. Dissolve in Chloroform and mix at not exceeding 61° C.

ℙ 1 **Physostigminæ Salicylas,** U.S., P. Austr., Fr. Cx., P.G. VI., P. Belg. IV., F.E. VIII., P. Ital. V.,

$C_{15}H_{21}N_3O_2.C_6H_4.(OH)\,COOH$ = 413·2346.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In needle-shaped or columnar crystals. Soluble 1 in 140 of cold water; much used as a myotic in solution. Not so liable to turn pink as that of the sulphate.

℗ **Tablets, Hypodermic** $\frac{1}{100}$ grain.

To open the bowels in acute abdominal conditions $\frac{1}{100}$ grain hypodermically until 6 doses have been given (four hourly). This dose is safe—higher dose may act too severely and necessitate bismuth and

opium to check the resulting diarrhœa. If no action give a turpentin enema the following day. The muscular coat of the intestine i directly stimulated by Eserine.

℞ **Physostigminæ Sulphas.** **P.G. VI., Ph. Ned. V., F.E. VIII.**
$(C_{15}H_{21}N_3O_2)_2\ H_2SO_4 = 648{\cdot}4512$.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (*B.P.*'14, $\frac{1}{64}$ to $\frac{1}{32}$ grain)

In yellowish granular crystals, deliquescent and soluble about 4 in of water. Solution becomes pink, but does not lose much in efficacy.

In doses of $\frac{1}{100}$ grain (**0·0006 Gm.**) of value in tympanites a occurring in typhoid fever.

℗ **Guttæ Physostigminæ R.O.H.** and **St. Th. H.**, $\frac{1}{2}$, 1, 2 or 4 grain to 1 ounce. St. M.'s H. 0·5%.

In glaucoma the 0·5 to 1% drops are suited for prolonged use.

The 1% solution instilled two or three times a day is of value. It contract the pupils and greatly improves vision.—Jl. Trop. Med., Sept. 1, '26,303.

℞ ℞ **Guttæ Physostigminæ cum Cocaina, St. M.'s H.**

Physostigmine Sulphate 0·25, and Cocaine Hydrochloride 1·25 in Water 100.

℗ **Guttæ Physostigminæ et Quininæ.** Liverp'l Eye and Ear Inf.

Physostigmine Sulphate 1 grain, Quinine Sulphate (Bisulphate) 4 grains Distilled Water 1 ounce.

℗ **Injectio Physostigminæ Sulphatis Hypodermica.** 1%. *Dose.*—1 to 4 minims (**0·06 to 0·24 Cc.**).

℗ **Lamellæ Physostigminæ (Sulphatis).** (*B.P.* '14).

Each contains $\frac{1}{1000}$ grain (**0·000065 Gm.**) for ophthalmic use.

℗ '**Sterules**' of Physostigmine Sulphate Solution 4 grains to the ounce are prepared, also ℞ ℞ '**Sterules**' of Physostigmine Sulphate, 1 grain with Cocaine Hydrochloride 4 grains to the ounce.

℗ **Unguentum Hydrargyri Oxidi Flavi cum Physostigmina.**

Physostigmine 0·25, Soft Paraffin or Lanoline (anhydrous) 100 ; heat till dissolved, and add, when cold, Yellow Mercuric Oxide 1.

For corneal ulcers in scrofula, solution of 2 grains to an ounce may be dropped into the eye ; also in mydriasis and glaucoma.

Diagnosis of glaucoma, a lecture on.—Lieut.-Col. R. H. Elliott, B.M.J. i./20,279.

℗ **Mistura Eserinæ Composita L.H.**

Dose.—$\frac{1}{2}$ ounce (**15 Cc.**).

Eserine Sulphate $\frac{1}{48}$ grain, Tincture of Nux Vomica 10 minims, Compound Infusion of Gentian to $\frac{1}{2}$ ounce.

℗ **Tablets of Eserine with Trunecek's Serum** (*q.v.*).

No. I contain 0·00025 Gm. Eserine in each, with the salts of 50 Cc. of Trunecek's Serum.

No. II contain in addition to the constituents of No. I atropine 0·00005 Gm. each, for use in the severest forms of intestinal inaction and in obese diabetic patients. Both forms of Tablets weigh 8 grains (0·5 Gm.) each.

Maximum dose of either—6 tablets per diem.

Eserine $\frac{1}{4}$ grain given *intravenously* by mistake caused great flow saliva and incontinence of urine and fæces. Atropine and Strychnine and Oxygen given. Temporary blindness and deafness. Ultimate recovery.—B. L. Slater, B.M.J. ii./22,1120

℞ **PILOCARPINA**, $C_{11}H_{16}O_2N_2$=208·1408. Fr. Cx.

An alkaloid obtained (0·5%) from *Pilocarpus microphyllus* (Maranham Jaborandi) and other varieties. Jaborandi was introduced into Britain by the late W. Martindale. Easily soluble in water. Soluble in alcohol, ether, chloroform and benzol.

For details of Assay, see Vol. II.

Uses of Pilocarpine and its Salts.

A powerful sudorific and sialogogue; after a time a large dose acts as an emetic, contracts the pupil of the eye, and causes approximation of vision.

The sweating and salivation from a full dose persist for 2 to 5 hours, the symptoms come on in about 10 minutes after taking the dose if external conditions are favourable. Hypodermically the alkaloid acts in 3 to 5 minutes. A reduction of temperature occurs. Jaborandi and pilocarpine have been used in a variety of diseases, most successfully in asthma, dropsy and uræmia, and as antidotes to belladonna and opium poisoning. For hiccough small doses every 2 or 3 hours are of value. Children proportionately are not affected by the drugs so much as adults. Externally promotes growth of the hair, *e.g.*, in alopecia. In alopecia $\frac{1}{6}$ grain of the nitrate increased to $\frac{1}{3}$ grain injected into the scalp is recorded to have made hair grow.

Small doses ($\frac{1}{20}$ grain) check night sweating of phthisis and do not over-dry the skin.

Puerperal convulsions have been treated by injections.

Relieves nerve deafness, also itching of jaundice and assists passage of gallstones.

Pneumonia is treated by hypodermic injections of $\frac{1}{10}$ grain and more, or given *per os*.

In tinnitus aurium (acute labyrinthine) hypodermically, it is of value in suitable cases.

Bronchial asthma. An almost constant sensitiveness to Pilocarpine and Epinephrin is said to be common to all sufferers. Cases reacting to the latter were relieved by 0·25 Cc. of 1 in 1,000 solution. Small doses should be used.—B.M.J.E. i./21,85.

Pilocarpine which causes marked activity of most other glands has no effect on the secretion of the mammary gland.—K. Mackenzie, Jl. Exp. Physiology, Dec., 1911; see also Pituitary Extract.

Antidotes to Pilocarpine and Jaborandi preparations:—

After evacuating the stomach, give Tannin, then Atropine Sulphate or Tincture of Belladonna; *vide* also Poisons and Antidotes.

Strangury may be caused by Pilocarpine in too large a dose.

℞ **Pilocarpinæ Hydrochloridum**, P.G.VI., U.S., Fr. Cx., Ph. Ned.V., P. Ital. V., P. Belg. IV., F.E. VIII. $C_{11}H_{16}O_2N_2HCl$=244·6056.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) by mouth or hypodermically. In minute granular snow-white crystals, slightly deliquescent and very soluble in water. M.pt. between 195 and 199° C.

Uses.—*Vide antea.*

Ⓟ **Hypodermic Tablets** contain $\frac{1}{6}$ grain (**0·01 Gm.**).

℗1 **Pilocarpinæ Nitras.** $C_{11}H_{16}O_2N_2.HNO_3=271·1566$.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (**0·003 to 0·012 Gm.**). Fr. Cx., F.E. VIII., and Ph. Ned. V. *Max. single dose* $\frac{1}{3}$ grain approx. *pro die* $\frac{3}{4}$ grain.

In minute white granular snow-like crystals, but may be obtained in large white prismatic crystals. ***Soluble*** 1 in 8·2 of water, but very slightly in cold alcohol. This salt, preferred in England, was the first pure preparation of Pilocarpine prepared,—it was obtained by the late W. Martindale from an alcoholic solution.

The ℗1 **Phenate** and **Salicylate** have similar dose and properties.

Ⓟ **Tablets** of Pilocarpine Nitrate $\frac{1}{10}$ and $\frac{1}{5}$ grain to be given *per os*.

Ⓟ **Guttæ Pilocarpinæ R.O.H.**

Used to contract the pupil of the eye. Ⓟ **Ophthalmic 'Sterules'** are prepared 1, 2 or 4 grains to 1 ounce.

Ⓟ **Injectio Pilocarpinæ Nitratis R.O.H.**

Dose.—2 to 6 minims.

Pilocarpine Nitrate 20 grains, Distilled Water 1 ounce.

G.H. has the following. 'Remove the patient's night-shirt, wrap closely in a warm blanket, and cover with two more blankets. Put hot water bottles to his feet, and give hot drinks freely. After sweating has ceased, remove blankets gradually, dry the skin and leave him between warm, dry blankets.'

Ⓟ **Hypodermic Tablets,** $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ grain (**0·006, 0·008, 0·01, 0·016, 0·02 and 0·03 Gm.**).

Ⓟ **Sterules, Hypodermic,** $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$ grain.

Ⓟ **Ophthalmic Discs,** $\frac{1}{500}$ grain, combined with gelatin.

Ⓟ **Lotio Pilocarpinæ,** for the hair.

Pilocarpine Nitrate 2 grains, Quinine Hydrochloride 8 grains, Glycerin 2 drachms, Rose Water 6 drachms. If *so ordered*, Cantharides Tincture 1 drachm may be usefully combined with above quantities.

Applied locally, and used internally or hypodermically, Pilocarpine seems to have an action in promoting the growth of hair in alopecia or dandruff. Used also in Ⓟ **Ointment,** 4 grains to the ounce of a mixture of wool fat and soft paraffin ointment.

Ⓟ **Granular Effervescent Pilocarpine Nitrate.**

Dose.—1 drachm containing $\frac{1}{10}$ grain for use in throat affections.

Ⓟ **Bromocarpin.** *Syn.* Syrupus Pilocarpinæ et Potassii Bromidi.

Dose.—For children 3 to 7 years of age 1 to 3 drachms daily; 7 to 15 years 1 to 6 drachms daily; adults $\frac{1}{2}$ to 1 ounce daily, *all spread over the day.* To be taken before meals.

Stated to have the composition Potassium Bromide 10, Pilocarpine Hydrobromide 0·005, Orange Syrup and Glycerin *q.s.* to 100, *by weight.* In epilepsy and nervous affections.

Ⓟ **Extractum Jaborandi Liquidum** (*B.P.* 1898). *Syn.* **Liquor Jaborandi.** 1=1 of leaves; in 45% Alcohol.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Ⓟ **Tinctura Jaborandi** (*B.P.* 1898). 1 in 5 of 45% Alcohol.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Ⓟ **Linimentum Jaborandi.**

Jaborandi Tincture 1, Cantharides Tincture 1, Soap Liniment 4.

For hair falling off, apply with friction.

PILULÆ.

As the excipient for pills intended to be varnished, use equal parts of powdered gum acacia and tragacanth with syrup *q.s.* Glycerin, if used at all is best mixed with alcohol. It is unsuited for hygroscopic drugs such as soft extracts, squills, aloes, etc. For these mucilage of acacia or syrup is preferred, and tragacanth in moderation is useful as a 'hardener.' For insoluble metallic salts, glycerin of tragacanth (*q.v.*) may be employed, adding, if necessary, a small quantity of powdered acacia or althæa to give firmness.

For **Aloes** Pills Compound Decoction of Aloes is sometimes used.

For **Camphor** a little Tragacanth or Soap and Castor Oil; if with Quinine, Tragacanth and Glucose Syrup, *q.s.*

Unguentum Kaolini (*q.v.*) works satisfactorily for oxidising agents such as **potassium permanganate.** For **Oils** soap is best used.

Syrup of Glucose is also employed; this is prepared by heating Glucose 1, with Syrup 2, *v. also* **Glucantha.**

Codeine and other Pills given in diabetes should not be massed with Syrup of Glucose.

Pill Varnish (*Martindale*). Sandarach 1, in Absolute Alcohol 1.

Sandarach, *Syn.* **Gum Juniper,** is a resin from *Callitris quadrivalvis* (*Coniferæ*). *Alcohol Sandarachi*, R.D.H. For dental use. Sandarach 2, Alcohol (90%) 1.

In **Coating** Pills with **Gelatin** the pills are held on needles or by suction in a frame and dipped in a solution of 1 part of gelatin in 4 parts of water.

In **Pearl-Coating,** the Pills are first covered with a mucilage of tragacanth 4 grains to 1 ounce with half a drachm of syrup added; they are then coated by rotating in a pot with French chalk.

The **Sugar-coating** of Pills is effected by placing them in a hemispherical metallic pan kept warm, while making eccentric revolutions, and are alternately moistened with syrup, and dusted with finely-powdered sugar, till dry and uniformly covered.

Methods of Coating Tablets, Pills, Capsules, etc. to render them insoluble in the Gastric Juice but soluble in the Intestines.

Various substances have been suggested for coating pills, tablets and capsules to render them insoluble in the stomach but soluble in the intestines, *i.e.*, on reaching the duodenum. Drugs, for example, which irritate the mucous membrane and the administration of which is liable to induce vomiting, and substances intended to act solely on the intestines, and the anthelmintic drugs, have been so given. The recent important requirements relative to **Iodo-Ray,** *q.v.*, should also be mentioned. *Keratin,* as usually employed, seldom brings about the desired effect.

Keratin is an ammoniacal solution of horn shavings in the form of a syrup, Sp. Gr. about 1·02. In using Keratin the pills must not contain moisture or vegetable powders. As a pill basis employ Kaolin with Suet, coat 3 to 5 times with the Solution and finally roll in non-absorbent powder. A coating of wax prior to the Keratin coating is sometimes employed.

Benzonaphthol Varnish.—Benzonaphthol 6, Tannigen 10, Salol 20, Alcohol (90%) 30, Ether 100, has also been recommended, but we obtained no better result with it.

Salol applied *melted* is more efficacious. 1½ to 3 grains of Salol applied in this way is suitable for a 3 to 5 grain pill. *Cf.* Bismuth Compound Pills.

***Stearettes** (T.M. 322854) (*Martindale*) are made with a coating containing **Stearic Acid** *inter alia*. Stearic Acid alone is useless—it cracks on drying.

Aceto-Salicylic Acid 2 to 5 grains.
Aloes 2 to 4 grains.
Antipyrin 1 to 5 grains.
Areca 2 to 5 grains.
Calcium Sulphide ½ and 1 grain.
Carbolic Acid ½ to 1 grain.
Emetine-Bismuth Iodide 1, 2 and 3 grains.
Ferrous Sulphate, Exsicc, 3 grains.
Iodo-Ray 0·3 and 0·5 Gm.
Ipecacuanha ¼ to 2 grains.
Magnesium Peroxide 3 grains.
Menthol ½ to 1 grain.
Methylene Blue ½ to 1 grain.
Naphthol Bismuth 2 to 5 grains.
Ox Bile 5 grains.
Pancreatin 1 to 2 grains.
Phenol Bismuth 2 to 5 grains.
Potassium Iodide 5 grains.
Quinine Aceto-Salicylate ½ to 2 grains.
Quinine Salicylate ½ to 2 grains.
Quinine Sulphate ½ to 3 grains.
Reduced Iron 1 to 3 grains.
Sodium Salicylate 2 to 5 grains.
Thymol ½ to 1 grain.
Trilactine.

Stearettes should as a general rule be given immediately after a meal—*i.e.*, when the stomach is *acid*.

Pills.—The 'Stearette' coating is also applicable to pills but with greater difficulty. Tablets are easier to operate upon.

Formagules (Formalised Gelatin Capsules).

Where the digestive functions are normal, these should pass the stomach intact and break up in the intestines.

The following **Formagules** are suggested :—

Aloes 2 to 4 grains.
Asafœtida 5 grains.
Copaiba 5 to 10 minims.
Creosote ½ to 2 minims.
Eucalyptol ½ to 1 minim.
Guaiacol Carbonate 1 to 4 grains.
Ichthyol 1 to 5 grains.
Iodinol 10 minims.
Male Fern Extract 10 minims.
Methyl Salicylate ½ to 1 minim.
Ox Bile 5 to 10 minims.
Quassia Extract 2 grains.
Salol 2 to 10 grains.
Santal Oil 5 to 10 minims and Compounds.
Santalol 5 minims.

Formagules should be employed for substances which irritate gastric mucous membrane, neutralise acidity of stomach, or are to act on intestinal membrane but not in the stomach, *e.g.*, to destroy worms.

They should be quite recently made. The hardening effect of formalising continues on keeping.

Sahlis Glutoid Capsules are made on these lines.

A revised list of pills in general request is contained in the Index.

***Pulverette** (T.M. 293309) **Powder Pills (Patent)** are of special manufacture. These have a thin coating easily crushed.

Cachets of wafer paper are useful for enclosing nauseous medicines and drugs that do not yield all their activity to any solvent, and those whose suspension in fluids is difficult or inaccurate owing to non-diffusibility or decomposition.

Capsules, Soft Gelatin, are used for nauseating oils, etc., *v.* Index

***Slipules** (T.M. 419586). This Registered Trade Mark is applied to hard gelatin capsules of the 'slipover' variety; the *number* of the slipule for a dose of the medicament is frequently shown.

				Content in Sodium Bicarbonate.
No. 5 Slipule (closed) has length	11 mm.	and diam.	4 mm.	3 grains.
,, 4 ,, ,, ,, ,,	15 ,,	,, ,,	5 ,,	4 ,,
,, 3 ,, ,, ,, ,,	17 ,,	,, ,,	5 ,,	5 ,,
,, 2 ,, ,, ,, ,,	18 ,,	,, ,,	6 ,,	6 ,,
,, 1 ,, ,, ,, ,,	20 ,,	,, ,,	6 ,,	8 ,,
,, 0 ,, ,, ,, ,,	22 ,,	,, ,,	7 ,,	10 ,,
,, 00 ,, ,, ,, ,,	24 ,,	,, ,,	8 ,,	15 ,,
,, 000 ,, ,, ,, ,,	26 ,,	,, ,,	10 ,,	25 ,,

They distinguish from the soft variety of Gelatin Capsule.

PINUS.

Pinus Sylvestris. *Syn.* SCOTCH FIR OR PINE.

From the wood of this tree (principally in America, France and Russia) much of the oleo-resin, common turpentine, oil of turpentine, Gum Thus or American frankincense, resin or colophony and tar (*vide* Pix Liquida) are produced. From its leaves also are prepared an extract, volatile oil and wool.

By 'Turpentine,' *i.e.*, **Terebinthina N.F.** and **P. Svec. X,** and in other countries, is meant the concrete oleo-resin obtained as exudate from various species of Pinus. Synonyms for this natural product are Gum Thus, Thus Americanum and Common Frankincense as mentioned. **Bordeaux Turpentine** is a variety obtained in S.W. France. **True Frankincense** is generally understood to be **Olibanum** from *Boswellia Carterii* and other species.

Oleum Terebinthinæ (Rectificatum) *B.P.* '14. (*Syn.* CAMPHINE), is distilled from the Oleo-Resin Turpentine obtained from *Pinus Sylvestris* and other species of *Pinus*. Sp. Gr. 0·860 to 0·870. Almost entirely distils between 156° and 180° C. without appreciable residue. O.R. varies from different countries.

Collection of Turpentine in the Landes Department of France, from Bordeaux to Biarritz.—P.J. ii./27,245.

Oleum Terebinthinæ Æthereum, FR. CX., is distilled from *P. Pinaster* in France. Sp. Gr. 0·864 at 15° C.

See Vol. II. for further data.

Capsules of Oil of Turpentine, 5 and 10 minims each. *Dose.*—1 or more.

Uses.—EFFECT OF OIL OF TURPENTINE ON THE KIDNEYS. Large doses produce sense of warmth in the stomach, accelerate circulation, and cause feeling of exhilaration with vertigo and fullness in the head: nausea and catharsis often ensue. In small doses frequently repeated it stimulates the kidneys, but if continued too long causes painful irritation of urinary vessels, and even violent strangury and inflammation of the kidney.—U.S.D.

In INTERNAL HÆMORRHAGE 10 minim doses often successful. In enteric has been given as capsule or emulsion with Spirit of Chloroform—10 minims every two or three hours. Anthelmintic (3 to 4 drachms or more) generally given with Castor Oil. Also given to remove fæcal masses (with Castor Oil) and to remove bile concretions.

Large doses, 2 drachms and more, have been given. For children of 10 to 12 as much as ½ ounce with equal quantity of Castor Oil.

HÆMOSTATIC ACTION of Turpentine when brought into immediate contact with the surface. Arrested hæmorrhage in a "bleeder" under operation. Use as a compress by soaking lint in it and squeezing nearly dry. Support by a pad of wood wool and fix with a firm bandage. The surrounding skin may blister. Also successful in secondary hæmorrhage in war wounds. Value when taken by the mouth doubtful.—Refs., Edn. XIX, p. 699.

An old-fashioned styptic for packing a tonsil bed.—R. S. Stevenson, L. ii/25,1332.

TAPE WORM. 1 ounce doses with castor oil. No injurious effect on the kidneys.

TYPHOID.—A preliminary thorough cleansing of the bowel by small divided doses of Calomel followed by Castor Oil prepares the ground for an enema of 1 ounce with Olive Oil 1 pint given slowly. Next day, or day after, repeated. In most instances the amount of Turpentine may then be reduced to ½ ounce in Olive Oil 15 ounces, this is administered on alternate days throughout the whole course of the disease and continued until convalescence is established.—B.M.J. i./10,195.

Give 20 minims Turpentine Emulsion (*e.g.*, U.S. X. *q.v.* or made stronger.—W. H. M.), or a capsule of 5 minims Oil of Cinnamon two or four-hourly and a half pint Ox Gall enema, and apply heat to the abdomen, if there is no hæmorrhage.—A. E. Gow, L. i./30,39. *See also Therap. Index.*

URETHRITIS.—In cases of a chronic kind, urethral chancroid and specific urethritis, local applications of Turpentine to the urethra by means of a catheter have given very satisfactory results.—L. i./11,982.

Death of a man of 39 following drinking of 6 ounces of Spirits of Turpentine. Lining of stomach completely macerated and lying in small pieces in the gastric cavity. The wall of the stomach felt like leather.—F. P. Maitland, B.M.J. ii./31,77.

'Turpentine Punch.' Ten drops of turpentine on a lump of sugar added to a wine-glass of ordinary whisky punch for septic pneumonia.—Sir J. Moore. Pr., Jan., '19, per Pres.

Sterules of Rectified Turpentine 15% in Olive Oil, 1 and 2 Cc. are made for intramuscular use.

Skin affections treated by Turpentine injections.

Dose.—0·5 to 1 Cc. intramuscularly every 4 to 7 days for adults; 1 to 2 minims weekly for infants up to 5, and 4 minims for older children. Used in skin affections caused by an infective agent or in which, as in pityriasis rosea or pemphigus, some form of micro-organism may be the causative factor. A 15% solution in Olive Oil with 0·5% each of Anæsthesin and Quinine Hydrochloride is used. The composition of **Terpichin** is similar. In some cases no benefit, *e.g.*, in erythema, urticaria or purpura. The best results were obtained in pyogenic conditions of the skin, associated with poor general tone, *e.g.*, in ecthyma, furunculosis, sycosis vulgaris, lupoid sycosis, abscesses and erysipelas. In severe cases of varicose ulcer the lesions became cleaner and rapid formation of granulations and epidermal tissue followed. The general effect is thought to be increased local cell metabolism.—L. ii./22,1287.

Turpentine Injections (10% to 20% in Olive Oil) at Mount Sinai Hospital. The site selected was the intersection of an horizontal line drawn from the posterior axillary border and a line one or two finger's breadth below the brim of the pelvis. At this part the needle easily strikes the periosteum, upon which the injection is made. Good in some cases of acne, especially good in ulcer of the leg.—Med. Rec., Jan. 14, 1922; Pr., Aug., '22,188; Jl. Trop. Med., June 1, '23,197.

Chilblains of the legs treated with Turpentine injections.—B.M.J. i./25,1194.

Artificial abscess formation in non-specific immunisation.—*See also* **Peptone** p. 669.

Emulsum Olei Terebinthinæ, U.S. X.

Average dose.—½ drachm (2 Cc.).

Emulsify Turpentine Oil 15, Acacia 5, with water 10, then add water to 100.

Another form:—Turpentine Oil and Quillaia Tincture, of each 20 minims, water to 1 ounce.

Enema Olei Terebinthinæ, St. M.'s H.

Turpentine Oil ½ ounce, Starch Mucilage to 10 ounces. L.H. has Turpentine ½ to 4 drachms, Enema Simplex to 1 pint. The Oil is mixed with ½ of the

Simple Enema. This is given and followed by the other half of Simple Enema. Enema Simplex is Soft Soap 1 ounce, Warm Water to 1 pint.

For flatulent distension of the colon of great value. On diagnosis of appendicitis, if considerable flatus, an enema of Turpentine Oil is of value. Some give a dose of Calomel, but the peristalsis set up may be harmful.

Stokes' Liniment, N.F. *Syn.* LINIMENTUM ALBUM.

Mix one entire egg with Rose Water 85 Cc. Strain and add Turpentine Oil 100 Cc., then Acetic Acid 20 Cc. Shake thoroughly to emulsify and finally add Lemon Oil 4 Cc.

Linimentum Album, N.H.I. *Syn.* LINIMENTUM COMMUNE.

Turpentine Oil 4 drachms, Soft Soap 66 grains, Ammonium Chloride 11 grains, Boiling Water to 2 ounces.

Linimentum Terebinthinæ (*B.P.* '14).

Contains Turpentine Oil 65%.

Knight's method is satisfactory.—Mix Solution of Potash (*B.P.* '98) 3 ounces with water 3 ounces in a bottle, add Oleic Acid 7 drachms previously mixed with Oil of Turpentine 3 ounces, and mix gently. To this emulsion add Turpentine 10 ounces with Camphor 1 ounce dissolved in it, in portions of 1 ounce or more at a time. Liquor Potassæ, *B.P.*'98 was 5.85%.

Linimentum Terebinthinæ Aceticum. *Syn.* **St. John Long's Liniment.** Emulsify Turpentine 3 ounces, Rose Water 2½ ounces, Acetic Acid 5 drachms, Oil of Lemons 1 drachm with yolk of one egg. A useful counter-irritant. *Distinguish from* Lin. Tereb. Acet., *B.P.* '14.

Gossypium cum Oleo Terebinthinæ. *Syn.* **Turpentine Wool R.D.H.** Cotton wool or gauze soaked in the oil and squeezed dry, packed into the tooth socket as a stupe.

Spiritus 'Antiparalyticus.' — Turpentine Oil 4, Oil of Amber 4, Camphorated Spirit 64, Solution of Ammonia 28. Used as a liniment.

Sapo Olei Terebinthinæ.

Turpentine 1, Soft Soap 2, Glycerin 1. As a vermicide—also a stimulant local application.

✱**"Sanitas" Fluid,** (T.M. 64575), the solution resulting from the action of water upon air-oxidised turpentine, containing as its active principles hydrogen peroxide, thymol, a soluble camphor, and some camphoric acid. A household disinfectant and oxidiser. Non-poisonous, does not stain linen. Is used in midwifery. **"Sanitas" Oil** has Sp. Gr. 0·95. A strong oxidising agent. For inhalation in phthisis. Diluted with spirit used as spray in a room, or 1 in 8 to 20 of olive oil for skin affections.

(Other T.M.s are 33175, 34778, 407550, 48108 and 444095.)

✱**"Sanitas Bactox"** (T.M. 279528). A disinfectant of the coal tar order for medical use.

Extractum Pini Sylvestris. Fir-Wool Extract.

A thick brown liquid, soluble in water and with pine odour; 2 to 4 ounces are added to a 30-gallon warm bath for rheumatism.

Oleum Pini, Oil of Pine. *Dose.*—½ to 3 minims (**0·03 to 2 Cc.**).

The oil of the leaf of *Pinus Pumilio* (*Coniferæ*) was official in the *B.P.* 1898 and is in U.S. X. It is used for inhalations.

In a pure oil not more than 1% distils below 165° C.—Finnemore.

The oil distilled from the fresh leaves of *Pinus siberica* is *B.P.* '14, as **Oleum Abietis.** Sp. Gr. 0·900 to 0·920. It should contain 30 to 40% of esters (calculated as bornyl acetate, $C_{10}H_{17}.C_2H_3O_2$), as determined by saponification with alcoholic potash. The aroma of this oil is entirely distinct from that of *P. pumilio* and *P. Sylvestris.*

MOSQUITO LARVÆ AND PUPÆ.—Pine Oil has a powerful or soporific or paralysing effect on, resulting in their death. A mixture of crude oil and Pine Oil, in the proportion of nine parts of the former to one of the latter, is effective in destroying all stages of Anopheline and Culicine larvæ and pupæ.—Am. Jl. Hyg., per Jl. A.M.A. ii./25,221.

Syrupus Pini Pumilionis—*Martindale.*

Dose.—1 drachm (**4 Cc.**).

Contains Pine Oil 1 in 60 in a dilute Glycerin and Syrup Solution.

Ⓟ 🅁 **Linctus Pini, Terpin et Heroin.**—*Syn.* Elixir or Syrup of Pine, Terpine and Heroin.—*Martindale.*

Dose.—1 drachm (**4 Cc.**). Resembles the foregoing with addition of $\frac{1}{48}$ grain Heroin Hydrochloride and $\frac{1}{4}$ grain of Terpine Hydrate per drachm. Both are useful soothing antispasmodic preparations.

Elixir Pini et Terpin Hydratis (Simplex).

Dose.—1 drachm (**4 Cc.**) diluted.

Similar to the last mentioned, but without Heroin and containing a minimum of Alcohol, for children's use.

Ⓟ 🅁 **Pinheroin.**

Dose.—1 drachm every 2 or 3 hours, if necessary.

Contains Heroin Hydrochloride $\frac{1}{40}$ grain, Terpine Hydrate 1 grain with Essence of Canadian Pine. A special preparation as a respiratory stimulant. Ⓟ 🅁 **Glycogelatin Pastils** (*q.v.*) are prepared containing each $\frac{1}{2}$ minim of Pumilio Pine Oil with $\frac{1}{8}$ Terpene Hydrate, and $\frac{1}{48}$ grain Heroin Hydrochloride.

Artificial Venice Turpentine:—Mix Resin 17, Linseed Oil (boiled) 1, Oil of Turpentine 8, or dissolve Resin in Oil of Turpentine; is mostly employed in the Arts. The true article exudes from the branches of the larch, *Larix Europæa* (*Coniferæ*). Common turpentine and artificial products consisting of colophony, resin oil and oil of turpentine, are often employed.

Larch bark is an astringent (owing to Tannin content) and diuretic.

Alcoolat de Fioraventi. *Syn.* Balsamum Fioraventi, Fr. Cx.

Venice Turpentine (Térébenthine de Mélèze) 10, Elemi 2, Storax 2, Galbanum 2, Myrrh 2, Laurel Berries (Baies de Laurier) 2, Aloes 1, Galangal 1, Ginger 1, Zedoary 1, Ceylon Cinnamon (Canelle de Ceylan) 1, Cloves (Girofles) 1, Raisins (Muscades) 1, Origanum Dictamnus flowers (Dictame de Crète) 1, Alcohol (80%) 60. Macerate 2 days *s.a.* and distil to obtain 50. It is used as an embrocation in rheumatism.

For alopecia, Liquor Ammoniæ 1, Baume Fioraventi 15, Spirit of Camphor 1. Apply with friction after washing with soap.

Balsamum Locatelli.—Venice Turpentine 18, Yellow Wax 12, Olive Oil 1, Balsam Peru 2, Dragon's Blood 1. For chilblains (even if broken).—Ph. Notes.

Dutch Drops, Haarlem Drops.—For lumbago and rheumatism.

Ph. Form says:—Form now generally adopted in Denmark and Holland is:—Heat to 165° C. in an iron vessel, large enough to allow some frothing, Linseed Oil 4 and Sulphur 1, with stirring, until mixture drops off the stirrer with a glassy appearance. Remove from the fire and add 15 parts (by weight) of Oil of Turpentine, and agitate until solution is complete or nearly so, then filter. The liquid should be limpid and of a brownish-red colour.

PIPERAZIN. Fr. Cx., F.E.VIII.

Diethylene-diamine. $HN<\begin{matrix}CH_2.CH_2\\CH_2.CH_2\end{matrix}>NH = 86{\cdot}094$.

(Piperazine Hydrate with $6H_2O$ is in addition official in Fr. Cx Supp. 1920. It contains 44·33% Anhydrous Piperazin).

T.M.: The word Piperazine by itself is not registered. A firm registered 166600/1892, a device embodying the word but disclaiming exclusive use of the word. Patents: All expired.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**), or 15 grains daily.

Manufactured by the action of sodium glycol on ethylene-diamin hydrochloride.—Further details, Edn. XIX, p. 702. Colourless alkalin deliquescent crystals of saline taste, soluble about 4 in 7 of water. Melt at 104° to 107° C., B.pt. 145° C.

Flavoring.—Glyl Sassafras, Glyl Caryophylli; Syrupus Aurantii

Uses.—Given internally for the uric acid diathesis, in gout and rheumatism, and urinary calculi. Said to prevent change from glycogen into sugar in diabetes.

It used to be taught that owing to impaired power of excreting Uric Acid by the kidneys, the observed accumulation occurs in the blood and that in consequence Sodium Biurate was deposited in tissues, *e.g.*, cartilages, giving the exciting cause of a paroxysm of gout. Of recent years the opinion has steadily tended back to closely resemble the original, but it is unfortunately *useless to administer a base and expect it to reach any spot in the body in sufficient quantity to have a chance against the Sodium which is so abundant in the blood and tissues.*—Sir A. E. Garrod.

Incompatible with alkaloidal salts, iron salts, quinine, sodium salicylate, spirit of nitrous ether.

Effervescent Piperazin contains 5 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**). Also made with **Phenocoll.** 5 grains per drachm. **Tablets** and **'Vescettes' of Piperazin,** 5 grains (**0·3 Gm.**) to be crushed and taken in a draught of warm water.

Glycero-Piperaz. — *Syn.* PIPERAZIN GLYCEROPHOSPHATE, BASIC. $(C_4H_{10}N_2)_2C_3H_5(OH)_2PO_4H_2 = 344{\cdot}2782$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A granular white salt very soluble in water, neutral to Litmus and containing 50% Piperazin. Our work has shown that this salt is the most easy of the kind to prepare and the most stable. It does not deliquesce as do the neutral and acid salts.

Benzo-Piperaz. PIPERAZIN BENZOATE—$C_4H_{10}N_2(C_7H_6O_2)_2 = 330{\cdot}1976$ and **Salicyl-Piperaz.** PIPERAZIN SALICYLATE—*Dose* 2 to 5 grains —$C_4H_{10}N_2(C_7H_6O_3)_2 = 362{\cdot}1976$ are crystalline salts also suggested for therapeutic use.

Piperazine compounds of substituted Phenyl-arsinic Acids subject of patent 252099.

Sidonal, New. *Dose.*—30 grains (**2·0 Gm.**).

TRADE MARK 229305/1900 was removed from the Register in 1914.

Said to be the anhydride of Quinic Acid. White crystalline powder, soluble about 1 in 2 of water, and about 1 in 11 of alcohol 90%. For gout. **Tablets** contain 7½ grains.

The original Sidonal was Piperazin Quinate. Details of the Patent (No. 11420/1899, which became void) in Edn. XVII, p. 650.

Piperidinæ Tartras. *Syn.* PIPERIDINE ACID TARTRATE.

$$CH_2\begin{matrix}<\\>\end{matrix}\begin{matrix}CH_2.CH_2\\CH_2.CH_2\end{matrix}NH\left\{\begin{matrix}CHOH.COOH\\CHOH.COOH\end{matrix}\right\} 235{\cdot}1406.$$

The tartrate of the base piperidine made by reducing pyridine in alcoholic solution, with sodium amalgam or from Piperine by distillation with Soda Lime or by boiling with Alcoholic Potash.

Dose.—15 grains (**1 Gm.**) three times a day. Colourless pleasant-tasting crystals, readily soluble in water. Uric acid solvent.

Effervescent Piperidine Tartrate.

Dose.—1 drachm or more; 5 grains in 1 drachm.

PIX LIQUIDA.

Syn. PIX PINI, U.S.X.

Tar (*B.P.* '14). Known in commerce as Stockholm Tar, obtained by the distillation of the wood of various species of *Pinus* (*Coniferæ*). *Further details in Vol. II.*

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in a pill with lycopodium, or in perles (2½ grains each).

As a diuretic and in bronchial catarrh and for coughs, it is useful and has been given for gastro-intestinal catarrh. ***Soluble*** about 1 in 1 of alcohol 90%. On account of their antiseptic properties both Wood and Coal Tar and preparations of them have been used for surgical dressings. The former yields Creosote, *q.v.*

Aqua Picis. **Tar Water.**—*Syn.* AQUA PICEA, EAU DE GOUDRON. Tar 1, Sand 3. Mix and add distilled Water 200. Macerate with shaking for 24 hours, filter. *Dose.*—5 to 10 ounces (**150 to 300 Cc.**).

Pix Burgundica. *Burgundy Pitch* (a misnomer as it comes from Normandy) the exudate from *Picea excelsa* (*Coniferæ*), was employed in making **Emplastrum Picis** (*B.P.* 1898).

Oleum Picis Rectificatum, **Light Oil of Tar. U.S. X.**

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**).

A distilled oil of Pine Tar, known also as Rectified Spirit of Tar with Sp. Gr. about 0·9, sherry-coloured or reddish; antiseptic.

Pilula Picis Liquidæ.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Tar 1, Soap 1, Compound Tragacanth Powder $\frac{1}{4}$, Licorice Powder $2\frac{3}{4}$. Useful for coughs and for hæmorrhoids—best freshly made.

Syrupus Picis Pini, Syrup of Tar, U.S. X.

South American *Syn.* JARABE BREA.

Dose.—$2\frac{1}{2}$ drachms (**10 Cc.**).

Mix Rectified Oil of Tar 1, with Water 450 and shake 15 minutes. Set aside 24 hours, filter and dissolve Sugar 850 in the filtrate and make up to 1,000. Ⓟ $\frac{1}{33}$ to $\frac{1}{10}$ grain of apomorphine hydrochloride may also be added to each dose. Useful in chronic bronchitis and winter cough.

Ⓟ **Syrupus Picis cum Codeina. P. Helv.**

Codeine 1, Sugar 505, Tar Water 324, Glycerin 150, Dilute Alcohol 20. *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).

Unguentum Picis Liquidæ. **Tar Ointment** (*B.P.* '14).

Contains 70% of Tar in a basis of Beeswax and Lard. U.S.X. has Pine Tar 50, Yellow Wax 15, Petrolatum 35. Useful in psoriasis and chronic dry eczema.

Unguentum Picis Compositum. Ringworm Ointment, Ph. Ned. V.

Heat together Water 20, Tar 16, Resin 4, and add with stirring Starch 16 mixed with Water 30, then Venice Turpentine 4, Acetic Acid 30% 8, and Water to 100.

Ether-Soluble Tar Paste. *Syn.* **E.S.T.P.**

In making this preparation Tar is distilled in steam and the Ether-Soluble distillate incorporated in a Zinc and Lanolin basis.

It is preferable to Crude Coal Tar as being cleaner and better tolerated. Most useful in infantile eczema, chronic eczema with lichenification, lichen simplex chronicus (Widal) and pruritus ani.—H. W. Barber and G. B. Dowling.

Oleum Cadinum. **U.S., P. Helv.** FR. CX. Supp. 1920.—*Syn.* **Juniper Tar Oil. Oleum Juniperi Pyro-ligneum. Huile de Cade.**

By distillation of wood of *Juniperus Oxycedrus* (*B.P.* '14) and some other species (*Coniferæ* or *Pinaceæ*). This oil varies enormously.

For Characters, Tests, and Results of some Experiments see Vol. II.

In most cases of psoriasis a seborrhœa of the scalp will be found. This is well treated with Soap and Water followed by a Salicylic Lotion, Oil of Cade 1 in 5 of Olive Oil and gradually increasing strength till the pure Oil is used.

A good deal is distilled in Spain. Extreme limits of Sp. Gr. observed during twenty years—0·955 to 1·064. Methods of making. Contains, if genuine (from J. Oxycedrus), high proportion of Cadinene and does not give reaction for pine tar.—C. T. Bennett, P.J. ii./21,166.

Oleum Cadini Aceticum.

Acetic Acid 1, Cade Oil 10. This and the former are used for alopecia. The following are used in psoriasis and dry eczema.

Unguentum Olei Cadini et Sulphuris.

Cade Oil 10, Sulphur 1, Vaselin 15, Lanolin 15.

Unguentum Olei Cadini.

Melt Yellow Beeswax 1, add Huile de Cade 1, and stir till cold. Lard may be used as a diluent if a weak ointment be required.

Unguentum Betulæ Compositum, St. G. H. Huile de Cade 1 drachm, Resorcin 10 grains, Ichthyol 10 grains, Oil of Sweet Birch 10 minims, Lard to 1 ounce.

Oleum Fagi Pyroligneum, Beech Tar.

On the Continent used as a source of creosote.

Linimentum Picis (Lassar).

Beech Tar 4, Birch Tar 3, Olive Oil 1, Alcohol (70%) 1.

Oleum Rusci Pyroligneum. Said to be obtained from **Butcher's Broom.** Is really identical with *Oleum Betulæ Pyroligneum*, **Birch Tar.** A yellowish-brown oil from *Betula Alba* (*L.*).

The above Oils are used instead of Tar in skin affections. The odour of russia leather is due to Birch Tar. They are all miscible with fats, but do not blend perfectly with alcohol.

Huile de Bouleau is obtained by distillation of *Betula Alba*.

No reason why Birch Tar should not be distilled in England or Scotland.—E. M. Holmes, P.J. i./21,508.

Unguentum Rusci Compositum. Birch Tar 30, Calamine 45, Resin Ointment 120, Zinc Ointment 120, Carmine Trituration 4, Liquid Paraffin 15. For chilblains, eczema, prurigo and psoriasis, and for irritation due to piles.

Ung. Sedresol (Ferris). (✱**Sedresol**, T.M. 278084.)

A combination of Beech-tar, Zinc Oxide and antiseptics. Sedative, antiseptic and healing in eczema, psoriasis, erysipelas, shingles, erythema, seborrhœa, dermatitis, pruritus ani and vulvæ, in inflammations and eruptions of the skin, and in burns and scalds.

PLUMBUM.

Pb=207·22.

Lead, its History and Occurrence.—G. M. Dyson, P.J. ii./30, 286,302,387. Medicinal and allied aspects.—*ibid.* 406.

Plumbi Acetas. *Syn.* SUGAR OF LEAD, **Saccharum Saturni.**

$Pb.(CH_3COO)_2.3H_2O=379·3036$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Colourless crystals or masses soluble in water 1 in less than 3; in Alcohol (90%) 1 in 30, in Glycerin 1 in 2.

Incompatible with Carbonates, Soluble Chlorides, Sulphates,

Tannates, Potassium Iodide and Opium preparations. The *Subac-tate* is incompatible with Acacia Mucilage.

Uses.—Astringent, *e.g.*, in severe diarrhœa, and as a hæmostat (of doubtful value) in gastric ulcer; it is a powerful poison. Externally for eczema, leucorrhœa, gleet, pruritus and for bruises.

Inoperable cancer treated by Lead Acetate sometimes with improvement 1½ grains daily for first week, then twice a day until patient becomes pasty yellow. Growths of the uterus do not seem to respond.—G. C. Belcher B.M.J. ii./25,1040.

Lead is an extraordinary poison as regards its selective action. It acts on the nervous system. It may act on the central nervous system, but it also acts on the peripheral—hence in chronic poisoning causes peripheral neuritis. Lead may cause gout—'poor man's gout,' as it is often called. Lead occurs in the ***urine of everybody*** at the present day.—Sir W. Willcox, M.P.C., Nov. 12, '30.

Intravenously Lead causes marked blood changes and there may be action on the nervous system, on the eye, kidneys, liver, and so on.—Sir W. Willcox, M.P.C., Nov. 12, '30.

Distribution of Lead in the body.—L. i./30,826.

Antidotes.—Emetics or Stomach Tube, Magnesium or Sodium Sulphate followed by stimulants.

Atropine in full doses relieves colic and keeps bowels open.

Plumbic optical neuritis due to poisoning with lead paint treated with Dilute Sulphuric Acid and Saline laxatives, hypodermic injections of Pilocarpine (the latter continued for six weeks): after the first few days Potassium Iodide, 5 grains thrice daily for a child of 8 years.

Potassium Iodide must be used with caution—sudden death may occur due to the entrance of a large amount of soluble lead salt.

Ocker's treatment with Sodium Hyposulphite (0·6 Gm.) in industrial poisoning in the States, also the intravenous injection of Calcium Chloride. 15 Cc. of 5% solution relieves colic.—B.M.J. ii./26,844.

Care must be taken to distinguish a Lead line from a Mercurial gum line as in lead workers.—L. ii./12,1138,1166. *Cf.*, Hydrargyrum, p. 467.

Lead poisoning from face enamel, which on analysis showed a very high lead content.—H. W. Woltman, per Clin. Jl., Jan. 24, '23,48.

Industrial poisons.—Lead, Arsenic, Mercury, Phosphorus, Radio-active substances—upon the different organs.—Sir Thomas Oliver, B.M.J. ii./28,83.

THE INCIDENCE OF CHRONIC NEPHRITIS in Queensland, Australia, found to be due to the use of White Lead paint on veranda railings—transferred by children from the hand to the mouth by nail-biting and thumb-sucking, and by the imbibing of rain-drops from the veranda rails. A combination of Titanium White and Zinc Oxide suggested as a good substitute for White Lead paint.—B.M.J. ii./29,1211.

MODERN TREATMENT OF LEAD POISONING.—Constipation treated by Magnesium Sulphate: colic by local heat, Amyl Nitrite, Nitroglycerin and Atropine. Calcium Chloride, 20 Cc. of 5% solution, given *very slowly* intravenously. Attempt elimination by Acid Phos. Dil. or Ammon. Chlor.—D. Hunter, L. ii./29,901.

Lead poisoning treated by artificial acidosis, produced by large doses of Ammonium Chloride, and by Parathyroid (Collip.).—L. ii./29,1106.

Lead storage and excretion in bones, and effect of Ammonium Chloride.—L. i./30,1005,1006.

Cumulative effect of infinitesimal doses, *e.g.*, from lead in the ***domestic water*** supply. Chief symptom a strange lethargy of body and mind—usual symptoms of plumbism absent. The remedy is simple, namely stop ingestion of lead. No medicinal treatment is necessary.—N. Porritt B.M.J. ii./31,94.

Abortifacient Use.—Morphine and a course of Mist. Alba successful. Blue Lead lines on gums disappeared. Children born in each case. In one the woman admitted taking 60 grains of Lead Acetate in a fortnight.—H. Craik, B.M.J. ii./26,908.

For some details of Lead Poisoning in the Potteries, etc., see Vol. II

Glycerinum Plumbi Subacetatis (*B.P.* '14).

This is similar to **Liquor Plumbi Subacetatis Fortis** (*B.P.* '14), with glycerin for the solvent in place of water.

Liquor Plumbi Subacetatis Fortis. *Syn.* GOULARD'S EXTRACT.

An improved method of making is the following: Triturate Lead Oxide (Litharge) in powder 320 Gm. with 100 Cc. of Distilled Water to form a smooth paste, and transfer to suitable bottle, washing in the remainder of Litharge with 650 Cc. of Distilled Water. Shake well with Acetic Acid 240 Gm., and shake vigorously for several minutes, then occasionally for 30 minutes. Set aside for 24 hours, shaking occasionally; filter and pass through sufficient Distilled Water to produce 1,000 Cc. Sp. Gr. 1·275 to 1·300.

Assay.—Place 6 Gm. in a 250 Cc. flask; add 25 Cc. of recently boiled Distilled Water, and 200 Cc. of N/10 solution of Oxalic Acid. Shake for several minutes, and dilute with Distilled Water to the mark, again shaking vigorously. Filter through a dry filter, rejecting the first 20 Cc. To 50 Cc. of the filtrate add approx. 150 Cc. of Distilled Water and 5 Cc. of Sulphuric Acid diluted with 5 Cc. of Distilled Water; warm to 80°, and titrate with N/10 Permanganate, maintaining the temperature above 60°. Deduct the number of Cc. of N/10 Permanganate required from 40. Each Cc. of the difference corresponds to 0·01036 Gm. of Lead. Titrate another 50 Cc. of the original filtrate with N/10 Sodium Hydroxide, using Phenolphthalein. Deduct the number of Cc. of N/10 Permanganate from the number of Cc. of the Soda required. Each Cc. of the difference equals 0·006 Gm. of Acetic Acid.—P. A. Berry, Austr. Jl. Ph., June, '30; Chem. Eng. and Mining Rev., Aug., '30 (Melbourne).

Sp. Gr. of Goulard's Extract, *B.P.* '14, should lie between 1·275 and 1·29, and the Lead Subacetate content between 26·5 and 28%.—J. E. Woodhead, P.J. i./31,28.

Liquor Plumbi Subacetatis Dilutus (*B.P.* '14) is 1 of the Concentrated Liquor with water *q.s.* to 80.

In chronic eczema the Glycerin of Subacetate of Lead is useful. It should first be applied diluted 1 part with about 7 of glycerin, or *better* 1 *with* 7 *of water*, and the strength gradually increased; it desiccates the eruption without producing a hard crust. Some uterine affections are well treated with the diluted glycerole. For inflamed joints after injury to bruised surfaces, lead lotion (warmed) is useful. It should be used with caution to the eyes if the cornea is damaged. In gonorrhœa, compresses are used prior to injections.

Liquor (or **Lotio**) **Plumbi Lactatis** is 1 part of Solution of Lead Subacetate to 9 of Milk. A little Eau de Cologne may be added. For nettle rash and any skin irritation.

Burns may be treated with Lotio Plumbi, some state, without danger from absorption.

Incompatibility with Phenol. See p. 15.

Unguentum Plumbi Subacetatis (*B.P.* '14.)

Strong Solution of Lead Acetate 1 in 8 in a compound basis.

Jelly-fish stings. Apply the following ointment. Lanolin 1, Paraffin Ointment 3, Almond Oil 4, Lime Water 8, Strong Solution of Lead Subacetate 4, Clove Oil $\frac{1}{12}$. Said to be superior to Carron Oil for this purpose.—Brooke.

Unguentum Glycerini Plumbi Subacetatis Dilutum.

Unguentum Glycerini Plumbi Subacetatis, *B.P.* 1898, with equal amount of Adeps Lanæ Hydrosus.

Unguentum Glycerini Plumbi Subacetatis, *B.P.* '98.

Glycerinum Plumbi Subacetatis, *B.P.* '98, 1, Unguentum Paraffini Album 5.

Injectio Plumbi L.H. (*Vaginal*).
Strong Solution of Lead Acetate 60 minims, Water to 1 pint.

Lotio Plumbi Talci et Amyli. (Formula of Boeck). Dilu
Lead Subacetate Solution, Talcum, Starch, and Boric Ac
Solution (1%) of each 10 by weight, Glycerin 4, Campho
Water 25. Relieves itching.

Linimentum Boeckii, P. Svec. X.
Dilute Lead Subacetate Solution 6, Talcum 18, Starch 18
Glycerin 8.

℗ **Lotio Plumbi et Opii.**
Tincture of Opium 1 to 159 of Dilute Lead Acetate Solutio
(1 drachm to 1 pint).
Although used to a certain extent in this form, Opium is said to b
entirely devoid of peripheral anæsthetic effects and Lead likewis
because the precipitation of proteins is prevented by the interventio
of the epithelium.

Lotio Plumbi Spirituosa. Lead Subacetate Solution 1, Glyceri
2, Alcohol (90%) 4, Rose Water to 32. Relieves piles promptly.

Lotio Plumbi Evaporans, R.O.H. — Diluted Solution of Lea
Acetate 4, Alcohol 90% 4, Water to 100.

Plumbi Nitras, $Pb(NO_3)_2 = 331{\cdot}236$. Colourless or opaqu
crystals. Soluble in water about 1 in 2.
Ingrowing toenail treated with Lead Nitrate as dusting powde
Remove scab that forms next day. Apply a little strong Phen
first,—this prevents pus which may form.—B.M.J. ii./13,746,939.

Plumbi Carbonas. Cerussa, **Ph. Ned.** $2PbCO_3,Pb(OH)_2 = 775{\cdot}675$
Heavy white insoluble powder, soluble in dilute Acetic and Nitri
Acids. Used as dusting powder for burns. 1 to 10% ointmen
in skin diseases.

Pasta Plumbi cum Cupro.—(A) Lead Carbonate 8 ounces, Mas
tich Varnish (*q.s.*) about 2 ounces, to make a thin paste. (B) Coppe
Sulphate, Zinc Sulphate and Lead Acetate of each 40 grains, rubbe
together. Mix A and B and add Linseed Oil 1 ounce. This ha
been used with success in bad cases of erysipelas.—Ph. Notes.

Plumbi Iodidum $PbI_2 = 461{\cdot}084$.
Yellow crystalline powder. Used to reduce swellings. Very
slightly soluble in water. 5 to 10% Ointment in skin diseases.

Plumbi Oxidum. *Syn.*—Litharge. $PbO = 223{\cdot}22$.
Yellowish-red powder (Massicot) or scales. To prepare Lead
Plasters.

Minium, P. Belg., *Red Lead,* $Pb_3O_4 = 685{\cdot}66$. Made by heating
Massicot.

Plumbi Guaiacolas. *Syn.* Lead Guaiacolate.
This compound has been prepared in the author's laboratories.
It is a white insoluble powder containing 45·71% of lead.
Theory for $Pb(OH)_2 \cdot Pb(C_6H_4OCH_3O)_2 = 53{\cdot}21\%$.
It may prove of value in medicine.

PODOPHYLLIN.

Syn. PODOPHYLLI RESINA.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) as a cholagogue and aperient pill or tablet. Takes 8 to 10 hours before producing evacuation.

The resin from the dried rhizome of *Podophyllum peltatum*—*Berberidaceæ* (*B.P.* '14 and U.S.X.)—American Mandrake, or May Apple, sometimes called Vegetable Mercury as it is a powerful biliary purgative and may be combined with a small dose of calomel for treatment of gallstones. It is useful in removing *ankylostoma* and other worms. Yellowish powder, soluble in aqueous ammonia and almost completely in 90% Alcohol.

Tests for Podophyllum Resin.—D. B. Dott, P.J. i./30,213,287.

U.S.X. requires Podophyllin not less than 75% soluble in ether, and not less than 65% in chloroform.

Podophylli Indici Resina (*B.P.* '14). From *P. Emodi* (also *B.P.* '14). Is richer in Podophyllotoxin than that from *P. peltatum*.

Podophyllotoxin. $C_{20}H_{15}O_6(O.CH_3)_3+2H_2O=480·2184$.

Is the principal constituent of Podophyllin. It is more certain in its action than Podophyllin and is given in dose of $\frac{1}{10}$ to $\frac{1}{8}$ grain, to children $\frac{1}{60}$ to $\frac{1}{30}$ grain. It is best administered by dissolving 1 grain in 2 drachms of 90% alcohol. *Dose.*—8 to 20 drops in a teaspoonful of syrup.

For further details of this body, see Vol. II.

Ⓟ **Pilula Podophyllin Composita.**

Podophyllin $\frac{1}{4}$ grain, Barbadoes Aloes 1 grain, Capsicum $\frac{1}{2}$ grain, Dry Extract of Belladonna $\frac{1}{4}$ grain, Excipient *q.s.* for one pill weighing 3 grains. One or two form a biliary aperient dose.

Ⓟ **Pilula Podophyllin et Quininæ** (**Poore's Pill**).

Quinine Sulphate 1 grain, Podophyllin $\frac{1}{12}$ grain, Milk Sugar $\frac{1}{12}$ grain, Dry Extract of Belladonna $\frac{1}{6}$ grain, Extract of Aloes 1 grain. To make one pill, or, if the quantities be taken in grammes, 15 pills, weighing 3 grains: useful 'dinner pills,' must be taken *with* food.

Ⓟ '**Dinner Tablets**' are similar; weigh 3 grains. They are recommended not coated for prompt action.

Tinctura Podophylli (*B.P.* '14).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Podophyllin 3·65% in Alcohol 90%.

Flavoring.—Syl Lavandulæ (double dose), Syl Amygdalæ Amaræ; Syrupus Zingiberis, Elixir Saccharini.

In dose of 2 to 4 drops in tea or coffee, taken night and morning, is useful in sick headache and biliousness, where the bowels and liver are sluggish in worried and overworked patients, and in chronic diarrhœa with cutting pains and high-coloured motions. Also relieves constipation with clay-coloured motions following diarrhœa of infants, 1 or 2 drops on sugar twice or three times a day.

Tinctura Podophylli Indici (*B.P.* '14) is also made same strength.

Tinctura Podophyllin Ammoniata.

Podophyllin 1, Aromatic Spirit of Ammonia 50. Dissolve, and after standing, decant. Is miscible with water.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**), diluted, as a purgative and cholagogue. The sal volatile acts as a corrective.

POTASSIUM.

K=39·10.

Sources of Potash Salts.—Potassium Chloride is obtained from the Strassfurt mines, also as *Sylvine* at Mulhouse in Alsace, and could be worked commercially from Fellspars in Scotland.—Sir T. E. Thorpe, B.M.J. i./18,64.

Potassium can be distilled unchanged in *dry* Oxygen.—L. i./30,26.

Potassa Caustica, Potassii Hydroxidum. KOH=56·1078.

Manufactured electrolytically or from the Carbonate and Calcium Hydroxide. White deliquescent sticks or cakes. (*B.P.* '14 not less than 85% pure. ***Soluble*** in water 2 in 1, and about 1 in 3 *w/v.* of 90% alcohol.

Incompatibles.—Acids, metallic salts, and alkaloidal salts.

Antidotes.—Any dilute vegetable acid, fixed oils, stimulants; not stomach pump or lavage.

Given in mixtures as **Liquor Potassæ** (*B.P.* '14, 5% *w/v.*), well diluted; also used as a caustic.

Liquor Potassæ *per os* caused remarkable improvement in cases of inoperable malignant disease.—D. M. Gall, L. i./24,1104.

A Liquor containing 5 Gm. of KOH in 100 Cc. has Sp. Gr. 1·045. P.G. VI is 15% *w/w.*

Flavoring.—Syl Menthæ Piperitæ, Syl Amygdalæ Amaræ.

Liquor Alkalinus, Brandish.

Dose.—For adults, up to 2 drachms. For ages 14 to 18 years 2 drachms; for children ½ to 1 drachm diluted. All these doses should be given diluted with milk or syrup.

This liquor contains about 5% Caustic Potash. In scrofula.—Hager.

VIENNA PASTE.—Caustic Potash 5, Slaked Lime 6, made into a paste with Alcohol. Used as an escharotic.

Pasta Londinensis is similar. Caustic Soda and Unslaked Lime of each equal parts, rubbed together in a warm mortar—made into paste when required for use as a caustic.

SUBSTITUTE FOR REMOVAL OF TONSILS.—'London Paste,' freshly made from the powder with a little Alcohol useful. About 8 weekly applications sufficient.—H. Norman Barnett, L. i./29,872.

Potassa Sulphurata (*B.P.* '14). Liver of Sulphur. Deliquescent yellowish brown masses, smelling of sulphuretted hydrogen. Used in skin affections. **Balneum** 2 ounces to 15 gallons.

Unguentum Potassæ Sulphuratæ. Liver of Sulphur 1, Sodium Carbonate 1, Lard 8. For ringworm.

Potassii Acetas. CH_3COOK=98·1234.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**).

Deliquescent white crystals, masses or powder. Diuretic and uric acid solvent. Soluble in Water 2 in 1, in Alcohol (90%) 1 in 2.

Flavoring.—Syl Pini, Syl Lavandulæ, Syrupus Aurantii.

Uses.—Is given to render the urine alkaline and has been employed in puerperal eclampsia. Diuretic in dropsical affections and has febrifuge properties.

Mistura Diuretica, St. M.'s H.

Potassium Acetate 20 grains, Sodium Nitrite ½ grain, Spirit of Juniper ½ drachm, Tincture of Ginger 10 minims, Water to 1 ounce.

The following is a useful mixture:—Potassium Acetate 20 grains, Solution of Ammonium Acetate 2 drachms, Vinegar of Squill 20 minims, Infusion of Broom 2 drachms, Water ½ ounce.

Mistura Diuretica, N.H.I.
Potassium Acetate 15 grains, Potassium Nitrate 7½ grains, Vinegar o Squills 10 minims, Decoction of Broom-tops (*B.P.* '85) to ½ ounce.

Potassii Benzoas. $C_6H_5COOK.3H_2O=214{\cdot}1858$.

Dose.—15 to 20 grains (**1 to 1·2 Gm.**). White crystals. Soluble in water 1 in 1½ and in alcohol (90%) 1 in 20. Uric Acid Solvent.

Flavoring.—Syl Aurantii Floris, Syl Vanillæ; Syrupus Aurantii.

Potassii Bicarbonas. $KHCO_3=100{\cdot}1078$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White powder or crystals soluble 1 in water 4. Insoluble in Alcohol (90%). Antacid, diuretic, and Uric Acid solvent. It is most valuable in acute rheumatism.

Flavoring.—Syl Cinnamomi, Syl Lavandulæ.

Potassii Bichromas. $K_2Cr_2O_7=294{\cdot}2$.

Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ grain (**0·006 to 0·012 Gm.**), in pill with Kaolin Ointment or in Capsule has been used in dyspepsia and gastric ulcer. Soluble 1 in 10 of water.

Antidotes. See **Antidotes to Poisons.**

In phthisis (2½ minims of 10% Solution in water) either alone or in a tonic mixture in a wineglass of water after food, at first twice and later three times daily, produced improvement in several cases. May produce vomiting at first.—L. ii./10,1484.

Dermatitis may follow the contact of Potassium Bichromate with the skin of susceptible persons. This may be avoided by frequently rinsing the exposed skin with a saturated solution of Sodium Bisulphite and then water. —Jl. A.M.A. ii./25,850.

Potassii Bromidum, $KBr=119{\cdot}016$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). Slipule No. 0 holds 10 grains.

(**Kalium Bromatum,** P.G., Fr. Cx., P. Hung., is Potassium *Bromide.* **Kalium Bromicum** abroad is Potassium *Bromate* $KBrO_3$. Some countries, *e.g.*, Sweden and Holland use Brometum to convey the Bromide.)

Colourless or white crystals with saline taste. Soluble in water 1 in less than 2, and in about 200 of alcohol 90%. It should be at least 97% pure.

Incompatible with Mineral Acids, Mercury and Silver Salts.

Flavoring.—Glyl Rosæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Hypnotic and sedative, and is given as a drink cure. Often given with other bromides, *cf.* Sal Bromatum, and with Chloral Hydrate, Arsenic or Belladonna.

Epilepsy.—Potassium Bromide with Nux Vomica will keep a patient free from fits whilst treatment is persisted in.

In recent epilepsy should be given for a long period (not less than two years). If no benefit from 45 to 75 grains per diem some other remedy should be tried. (It is cumulative.) Addition of Belladonna may be useful where there is incontinence.

The following mixture has been recommended :—

Potassium Bromide 1 ounce, Potassium Iodide 2 drachms, Ammonium Bromide 3 drachms, Ammonium Carbonate 1 drachm, Tincture of Calumba 1 ounce, Water to 6 ounces. One teaspoonful before

each meal and three teaspoonsful at bedtime. If *petit mal* exis alone, or co-exists with complete epilepsy the dose of Ammoniu Bromide must be increased and that of the other diminished.

BROMISM.—To avoid the onset give Fowler's Solution of Arseni and maintain the antisepsis of the bowels by purgatives and salc

Patients saturated with Bromides exhibit anæsthesia of the pala —a little known but useful diagnostic. Tickling the palate with feather is a good means of eliciting the information. The effect Bromides is enhanced by adding Potassium Bicarbonate in dos equal to about a quarter of the total Bromide given.

Small doses, *e.g.* 5 grains once a day long continued, are bett than larger doses for shorter periods.—M. Craig, L. ii./17,979.

Bromide intoxication has been treated with 100 Cc. Normal Saline increase to 400 Cc. intravenously.

ERECTIONS IN GONORRHŒA.—15 to 35 grains with Lupulin 1 to 2 grai and Camphor 1 to 2 grains in a cachet, two to four daily.

PUERPERAL ECLAMPSIA is treated with it combined with Belladonna.

Forty-five operations, including two gastro-enterostomies and two lip canc operations, done under local anæsthesia from injection of a 1% solution Potassium Bromide.—Jl. A.M.A. ii./25,235.

Tablets contain 5 and 10 grains.

℗ **Mistura Dysmenorrhœica, E.G.A.**

Potassium Bromide 15 grains, Sal Volatile, Tincture of Hyoscyamu *a.a.* ½ drachm, Spirit of Chloroform 10 minims, Water to ½ ounce.

℗ **Elixir Quinque Bromidorum.** Can. Form.

Potassium and Sodium Bromides of each 10, Ammonium Bromid 6, Calcium Bromide 3, Lithium Bromide 1, Tincture of Cannab Indica 6, Aromatic Elixir, sufficient to make 120. Dissolve th Bromides in the aromatic elixir, add the Tincture of Cannabis Indic and filter if necessary. *One drachm contains 15 grains combine Bromides.*

℗ **Mistura Bromidi et Digitalis. St. M's. H.**

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Potassium Bromide 20 grains, Digitalis Tincture 5 minim Potassium Citrate 15 grains, Compound Tincture of Cardamom ½ drachm, Chloroform Water to 1 ounce.

Potassii Carbonas. *Syn.* SALT OF TARTAR. K_2CO_3=138·2.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White deliquescent powder. Soluble in water 4 in 3, insoluble alcohol 90%. Employed externally; internal properties similar those of the Bicarbonate. Commercially contains about 16% H_2

Potassii Chloras. $KClO_3$=122·557.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured by passing chlorine into water holding lime or magnes in suspension, treating the clarified liquid with Potassium Chloride, a crystallising the resulting chlorate from the liquor. Colourless crystals wi saline taste. ***Soluble*** in water 1 in 16.

Incompatible with Oxidisable substances, Ferrous Salt Sugar, Nitrites, Calomel, Hypophosphites, Vegetable Powder Potassium Iodide.

Uses.—Antiseptic and a powerful oxidising agent. Is useful

stomatitis *e.g.* in children and in sore mouth arising from Mercurial treatment. Must not be given when the kidneys are diseased.

Poisoning by 40 Gm. Potassium Chorate. Recovery following transfusion of 200 Cc. of whole blood, followed by second transfusion after 3 days.—B.M.J.E. i./26,30. See also L. ii./07,1175.

Less toxic than Potassium Chloride. Average lethal dose in rats intravenously 1·5 Gm. per kilo (Chloride 0·82 Gm.).—J. L. Ulrich and V. A. Shternov, Jl. Ph. and Exp. Ther., Jan., '29,8.

Water sterilisation by Chlorine liberated from, *vide Vol. II.*

Lozenges weighing 20 grains, and **Tablets** weighing 5 grains, **plain and Ⓟ with Borax and Cocaine** $\frac{1}{260}$ grain, are useful to allay irritation and improve the voice. Gargle, spray, mouth wash may be 2% strength. Chlorine Gargle is made from it.

Pulvis Potassii Chloratis Compositus, C.L.T.E.

Potassium Chlorate, Borax, Sodium Bicarbonate, equal parts. Forms the solids of :—

Collunarium Potassii Chloratis Compositum, C.L.T.E.

Directions.—One teaspoonful to be dissolved in a quarter pint (½ tumbler) of tepid water. Half of the solution to be injected with a syringe along the floor of each nostril night and morning. Afterwards blow the nose freely.

Chloratifrice, a tooth paste, contains this Salt. For spongy gums and to prevent Tartar and act as a general antiseptic.

Potassii Chloridum. KCl=74·557.

Has been advocated for use in place of table salt by gouty and rheumatic individuals ; the following is better to taste :—

Pulvis Potassii et Sodii Chloridi Compositus.—*Oliver.* Potassium Chloride 16, Sodium Chloride 8, Lithium Benzoate 1. A half-drachm measureful to be taken.

The late Sir W. Roberts advocated Potassium Chloride for increased arterial pressure. Oliver found a tendency to indulge in the use of salt in advancing age (over 65). When Potassium is ingested in excess of Sodium, a loss of the latter takes place from the system.

Table Salt containing 50% each Sodium and Potassium Chloride, to automatically supply Potassium salts lost in the preparation and cooking of food. Apart from the problematical relation of Potassium deficiency to cancer, Potassium is a valuable addition to dietary and effective in preventing gout and rheumatism.—F. S. Rose, P.J. ii./26,411.

Potassii Citras. $C_3H_4(OH).COOK)_3$, H_2O = 324·3566.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

A white powder obtained from citric acid and potassium carbonate.

Flavoring.—Syl Anisi ; Elixir Saccharini ; Syrupus Pruni Virginianæ.

Uses.—It has diaphoretic, diuretic, and febrifuge properties. It has expectorant uses in the early stages of bronchitis and tracheitis. Also for gout, and in enuresis where the urine is over-acid. Large doses are useful for the acidæmia of diabetes.

ŒDEMA in disease of the gastro-intestinal tract in infants removed. Appears to act better than other diuretics.—Pr., May, 1911, p. 686.

NEUROTIC DYSPEPSIA.—Sip early in the morning a tumbler of hot water containing a teaspoonful of it.—B.M.J. ii./11,1529.

LACTATION improved by 15 grain doses.—B.M.J. i./17,765.

'Vescettes' of Potassium Citrate, 15 grains.

To be crushed and taken in a draught of warm water.

℞ **Potassii Cyanidum.** *Syn.* Potassium Cyanuret (an old name) Kalium Cyanatum, Cyankali, Cyanure de Potasse. KCN 65·108. Fr. Cx.

Dose.—$\frac{1}{12}$ to $\frac{1}{4}$ grain (**0·005 to 0·016 Gm.**).

Fr. Cx. has *max. single dose* $\frac{1}{6}$ grain. Max. during 24 hours $\frac{5}{8}$ grai

A crystallised salt or in fused masses.

Antidotes.—See Acid Hydrocyanic.

℞ Trade Varieties. In addition to the *B.P.* '14 salt (about 90 pure) are '**Gold Cyanide**' 98 to 100%, really a double Cyani of Potassium and Sodium, but, we understand, the *B.P.* '14 artic is also used for gold extraction. 30% pure is supplied in stick this is 'silver cyanide,' for silver extraction.

Potassium Cyanate, KCNO, is made by oxidising Potassiu Cyanide or Ferrocyanide. Colourless crystals readily soluble water. We have no information as to the Cyanate having been us in medicine.

Potassii Ferrocyanidum.

$K_4Fe(CN)_6,3H_2O=422·3348$.

Dose.—8 grains (**0·5 Gm.**). Said to be physiologically almo without action.

Potassii Iodidum. KI=166·032.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**)—often much increased.

(**Kalium Jodatum,** P.G., Fr. Cx., is Potassium *Iodide.* Potassium *Iod* KIO_3 is called **Kalium Jodicum** in German. Some countries, *e.g.*, Swed and Holland, use **Jodetum** to convey the Iodide.)

In white or colourless cubic crystals or **Small Granular Cryst** soluble in less than its own weight of water, and in 12 parts Alcohol 90%.

A slightly alkaline solution keeps better than an acid one. ***In compatible*** in solutions with Spiritus Ætheris Nitrosi, Sa of Iron (except Ferri et Ammonii Citras and Liquor Ferri Acetati Salts of Bismuth, Lead and Mercury, with Liquor Strychninæ Hyd chloridi, with Quinine Sulphate and other alkaloidal Salts, Silv Nitrate and Potassium Chlorate.

Flavoring.—Syl Lavandulæ, Glyl Menthæ Piperitæ, S Vanillæ, Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In universal use in the later stages of syphilis, in arteri sclerosis and certain cases of gout and rheumatism.

For actinomycosis it is specific; very large doses are given. one case (severe) it was only when the dose reached 240 *grains da* that *improvement began.* Carbolic Lotion 1 in 80 was quite suf cient locally. Thomassen's Method is 10 grains thrice daily f the first *week,* 15 grains the second, and 20 grains the third, i creased to 35 grains. Sporotrichosis and blastomycosis, also r spond.—A. Castellani, L. i./20,943.

In actinomycosis *not* found effective.—Colebrook, B.M.J. i./22,7

Rheumatoid arthritis best treated by 10-grain doses thri daily with Guaiacol Carbonate.—A. P. Luff; *see also* Guaiacol Ca

In fibrositis it is perhaps the most valuable drug. It appears

act by removing the hyperplasia and serous exudation in the fibrous tissues. Full doses (10–12 grains) with Nux Vomica or Syrup of Glycerophosphates.—A. P. Luff.

Administration of Potassium Iodide in large doses is a survival of the old AIX-LA-CHAPELLE TREATMENT for late specific lesions—quite unabsorbed. Free Iodine is less irritating than Potassium Iodide or Sodium Iodide in large doses. 10 grains of Potassium Iodide thrice daily for less than a week has produced violent catarrh with discharge from eyes and nose, swelling of eyelids and pustular eruption. Tincture of Iodine 5 m. thrice daily is well borne.—'Indian Physician,' C.D., April 2, '21,475.

Absorption.

Potassium Iodide solution, even with soap present, is not absorbed by the skin, but when applied as an emulsion in such substances as Vaseline, Lanoline and Stearic Acid, it can be detected in the urine within 12 hours.—J.C.S., A. i./25,1116.

ASTHMA is treated by Potassium Iodide in 5-15 grain doses twice or thrice daily. Extract of Stramonium may be added. Reliable both during the paroxysms and in the interval.—Yeo.

In ANEURISM moderate to full doses.—Yeo. The addition of Ammonium Bromide is often useful.

In ARTERIOSCLEROSIS 3 to 5 grain doses thrice daily with Potassium Bicarbonate 5 to 10 grains, Sal Volatile 20 minims, and an ounce of Gentian Infusion continued for four months at a time with interruptions of ten or twelve days. One or two tablets of Nitro-glycerin as well to promote vascular relaxation.—Yeo.

Iodine Therapy. Iodides may prevent or retard arterial changes and arrest them. Iodine metabolism no doubt responsible. The duration of life may be extended in the future.—W. Mitchell Stevens, L. i./30,1235.

In TINNITUS AURIUM associated especially with vertigo, due to labyrinthine disease, may be used in large doses. Also used in MIDDLE-EAR DISEASE in dry forms.

Acute PAROTITIS is favourably treated by painting the swelling with Iodine and giving Potassium Iodide internally.

Obstructive LYMPHANGITIS well treated with Potassium Iodide.—S. L. Rodriguez, per Clin. Jl., Feb. 14/23,83.

TUBERCULOUS EXPECTORATION is greatly assisted by its use.

CARDIO-VASCULAR SYPHILIS.—Potassium Iodide the most efficacious treatment, though explanation of its action is difficult. Iodine by inunction may be substituted. Mercury is not more effective than Arsenic, but safer. 0·3 Gm. Novarsenobenzol at intervals of a week over long periods, till 5 Gm. have been taken. Iodide and Mercury continuous, and a course of Organic Arsenic added from time to time.—Carey F. Coombs, B.M.J. ii./30,893.

LEPROSY.—Extremely useful in the last stages of recovery, but should only be used in patients maintaining a high resistance and tolerating full doses of Hydnocarpus esters.—E. Muir, T.R.S.T.M., Aug., '31,94.

In LOBAR PNEUMONIA for the combined use of Potassium Iodide and Creosote, *vide* **Mistura Creosoti et Potassii Iodidi.**

In BRONCHIAL AFFECTIONS the Iodides cause a watery exudation through the bronchial mucous membrane, hence of utility.

✱**Salodine** (T.M. 453,485, Cl. 42) is an **Iodised Table Salt.** Suitable for use as a goitre prophylactic. Both for the table and cooking purposes.

Exophthalmic goitre, discussion on. Small doses of Iodide, *e.g.* Sodium Iodide 3 grains daily, for 10 days each spring and autumn found efficacious in girls in reducing the number of cases of goitre

in districts where it is endemic, and it is not unreasonable to expec that by reducing the tendency to *simple goitre in early life*, we ma also lessen the number of cases of *Graves' disease occurring in late life*. This preventive treatment is, however, quite *unsuited for thos who already show signs of hyperthyroidism*.—G. R. Murray, B.M.J ii./22,908. Speakers differed on the question of Iodide treatment

Goitre is endemic in the valleys of E. and N.E. Lancashire. 2½ or 3 grains Sodium Iodide thrice daily for six weeks, then discontinued for a month an resumed indefinitely. Large goitres disappear.—R. Stewart, B.M.J. ii./21,84

Iodine (Potassium Iodide) in small doses will prevent and cure simp goitre. CHLORINE to some extent also prevents thyroid enlargement. Iodin deficiency comes about through absence of Iodine from food, vegetables, et —R. McCarrison, B.M.J. i./22,636.

GOITRE AND CALCIUM have obvious relationship. The viscosity of th thyroid secretion varies immensely. This depends on its Iodine content. I limestone districts (Switzerland and DERBYSHIRE) large goitres containin thick colloid are usual. This 'colloid' is poor in Iodine. These goitr vanish under use of Iodine or Thyroid preparation rich in Iodine. The Iodin combines with the Calcium to form Calcium Iodide.

Further, fat taken above normal requirements will form soaps with th fatty acids combining with all the Calcium (and other alkalies) present. Th will lead to Calcium starvation. The part played by fat in the productio of goitre is only a link in the chain of Calcium absorption or starvation.— S. Pern, B.M.J. ii./22,532.

SWITZERLAND has attacked the goitre problem. CHATIN'S HYPOTHES (enunciated in 1850) is thought to be correct there, namely that it is correlate with a low Iodine content of drinking water.

Baumann concluded that the (goitrous) thyroid gland seeks, by increase size and surface to make up for the lack of Iodine in neighbourhoods whe the supply is scanty. Chatin demonstrated how *poor in Iodine is the wat in Alpine Valleys*. The same has been found in U.S.A. The sea spray thought responsible for carrying the Iodine hundreds of miles from the s coast and from the Great Salt Lake.

Dosage.

As small an amount as 0·1 mgr. of Potassium Iodide thought to have ant goitrous action. Table salt could be used dietetically. **'Vollsalz'** containin 0·25 to 0·5 Gm. Potassium Iodide to every 100 kilos in use in the Canton Appenzell. A sensible measure.—L. i./23,660.

The **Swiss Goitre Commission (1922)** after exhaustive investigations fix the maximum amount as 1 part Iodine in 200,000 parts of salt. This is th amount adopted in this country. Marine in the U.S.A advises 1 in 500 mildly goitrous districts.—J. A. Goodfellow, B.M.J. i./25.331.

The amounts of Iodine recommended by the Swiss Commission are to small for goitrous districts. Five to 10 mg. of Iodine weekly is sufficie for prevention among school-children, and 10 mg. per week should be giv during pregnancy and lactation.—Medicine, 1924,3,453, per P.J. i./25,546.

Promising results obtained in Graves's disease with a daily dose of 15 dro of 1 in 20 aqueous solution of Potassium Iodide, containing 0·0033 G Potassium Iodide per drop.—B.M.J.E. ii./24,49.

Sweets containing 1/10 grain of Iodine given every 5 days are a goo preventive measure for children, and in many cases sufficient to effect a cur The aim should be to ensure that the thyroid receives its normal Iodi requirement, which is about 2 grains per year. Most cases of noctur incontinence also cured by the use of these sweets.—K. Fraser, Cumberlan School M.O. Report, 1925.

From a trial in several Derbyshire schools Iodised sweets not recommende —P. H. J. Turton, L. ii./27,1170.

Iodine given over long periods without thyroidectomy does not cure exop thalmic goitre. Use of Lugol's Solution prior to operation increases percenta of patients who can be operated on in one stage.—H, M, Clute, Jl. A.M.A Jan. 9, '26,105.

Iodine deficiency theory in goitre unproven. The treatment should be carried out with care, not by wholesale medication.—W. M. Ash, L. ii./26,1022.

Number of cases of Iodine hyperthyroidism greatly increased since discovery of efficacy of Iodine in exophthalmic goitre.—Am. Jl. Med. Sci., per Jl. A.M.A. ii./25,1161.

Hyperthyroidism resulting from use of Iodine in goitres of long standing. Dosage should be considered in terms of milligrams rather than of grains, the ***maximum dosage for an adult being 10 mg. daily for not longer than one month,*** the patient being kept under very close observation during this time.—O. P. Kimball, Jl. A.M.A. ii./25,1710.

Glasgow, which gets a pure supply of water from a highland lake, is immune from goitre. Possibly the particles of inorganic mineral matter of a calcareous nature in the turbid water of some of the Swiss glacier rivers and of the Himalayas are causative.—Sir James Berry, L. i./26,269.

It is not clear that all endemic goitres are of the same order, or due to the same cause, and no agreement as to the amount of Iodine required to prevent simple goitre has been reached. The use of Iodine in experimental work in **New Zealand** was not conclusive in prevention. The goitre problem seems to be a domestic one for each locality.—B.M.J. i./25,321.

Iodine over a long period should not be given to adults and when used periodically frequent observations of the pulse and weight should be made. Under no circumstances should Iodine be administered to adults with fetal adenomas, with or without symptoms of hyperthyroidism, except for short period prior to operation. Instances of the dangers of exciting hyperthyroidism given.—C. L. Harstock, Jl. A.M.A., '26,1335, per P.J. ii./26,303.

Roy. Soc. Med. discussion on Iodine therapy in exophthalmic goitre.—B.M.J. i./26,478.

In exophthalmic goitre it is *to be avoided.* Iodine is being poured into the system in excess by thyroid secretion.—B.M.J. ii./25,1249.

See also Sodium Iodide, p. 768, *Endemic Goitre, Vaccine Chapter and Goitre, Therapeutic Index.*

Chlorination of Drinking Water was objected to by James Oliver (M.P.C., July 6, '27) as causing ***possible elimination of or deficiency in Iodine,*** but by an extensive investigation in the author's laboratory in 1928—1929, working on 25 litre quantities it was proved that this ***does not occur*** in the Metropolitan Water Board supplies. ***The town-dweller is not deprived of the Iodine he needs.***—See Vol. II in which the subject is dealt with *in extenso.*

Animal nutrition—importance of Iodine in experiments with pigs. Complete mineral salts added to the feed at the rate of ½ ounce per head per day, *containing Potassium Iodide,* give better results than the incomplete salts (Potassium Iodide omitted). There is less Iodine in water in chalky districts, *i.e.,* in water containing an abnormally high proportion of Lime.—J. C. Rushton, Staffs. Farm Institute, Penkridge, Stafford.

The importance of the place of Iodine in life and nature is dwelt upon in a pamphlet by S. L. Bensusan from the aspect of nutrition of animals and plants, public health, and medicine.—De Gruchy & Co., Ltd., 48, Mitchell Street, London, E.C. *See also* 'Iodine for Live Stock,' by F. E. Corrie.

Foot and Mouth Disease.

Painting with Iodine said to be valuable—both curative and preventive. The disease has been prevented in foals by feeding Iodine to the mare during gestation and thus transmitting to the offspring. Many farming areas are void of Iodine in soil and vegetation. Iodine painted on put an end to navel-ill. The ingestion of Iodine advised. 6 to 8 ounces Potassium Iodide mixed with 100 lbs. salt to be placed where cows have access to it. For pregnant mares 1 teaspoonful Potassium Iodide in the feed twice monthly.—Trans. Highland and Agric. Soc. Vol. XXXVI, 1924.

Sterules, Hypodermic, of **Potassium Iodide** contain 5 grains.

Pilula Potassii Iodidi.—Contains 1 grain or more.

Potassium Iodide 1 grain, Sodium Carbonate Exsiccated ⅛ grain, with Tragacanth and Syrup. **Tablets** and **Capsules** contain 5 grains.

Potion Iodurée

Potassium Iodide 0·5 Gm., Syrup of Orange 25 Gm., Distilled Wa 100 Cc., to be taken in three portions during the day.

Linimentum Potassii Iodidi cum Sapone (*B.P.* '14).

Mix fresh Curd Soap in fine shreds 16 with Water 80, and Glycerin 8, in porcelain dish on a water bath. When dissolved, pour the liquid on to Pot sium Iodide 12 in powder in a mortar. Triturate briskly until cold. S aside 1 hour; and add Lemon Oil 0·8.

Iodine cannot be traced in the urine after its use—*cf.* p. 707.

A soft **Jelly-form Liniment of Potassium Iodide and Soap** may produced with Soft Soap ½, Potassium Iodide 1½, Glycerin 1, Water 10. T following is somewhat stiffer: Soft Soap 1, Potassium Iodide 1½, Glycerin Water 10.—P.J. ii./04,376.

Nascent Iodine Treatment in tuberculosis, etc., is dealt with on p. 510

Potassii Nitras KNO_3=101·108. *Syn.* NITRE. *Dose.*—5 to 20 grai (**0·3 to 1·2 Gm.**). Should be given well diluted.

Flavoring.—Syl Rosæ, Glyl Lavandulæ, Syrupus Tolutanu

Uses.—Diuretic, to be given in dilute solution with cautic Its chief use is in the preparation of powders for burning in asthm

In chronic PERICARDITIS great alterations in the area of dullness may foll the employment of diuretics such as preparations of Potassium Nitrate, Squ Digitalis or Scoparium.

In PNEUMONIA has been tried in full doses. The diet should be salt-fr The effect is remarkable; temperature falls in a few hours. Give 60 gra in solution every 3 hours for the first day, and then gradually reduce the d each succeeding day. To increase circulation in the lungs nitroglycerin $\frac{1}{100}$ $\frac{1}{50}$ gr. every three hours.—H. G. Hughes, N.Y.M. Jl., Sept. 9, 1911; Pr Dec. 1911, p. 300. For further abstract of this paper see Edn. XVIII, p. 7

Poisoning by Potassium Nitrate.—B.M.J. i./11,1,052.

Antidotes. See **Poisons and Antidotes.**

Fumus Potassii Nitratis (Nitrated Papers).

White blotting-paper, impregnated with 20% Nitre solution. T relieve asthma these are burnt and the fumes inhaled.

Asthmatic Pastilles are prepared in cones containing a mixture chlorate and nitrate of potassium.

Ⓟ **Pulvis Lobeliæ Compositus.** ASTHMA POWDER.

Potassium Nitrate 240, Boiling Distilled Water 240. Dissolve a add to Lobelia in powder, Stramonium Leaves in powder, Black T in powder, 240 of each. Mix well, dry, and add Oil of Anise The fumes of half a teaspoonful or more to be inhaled six or eig times a day and the bedroom fumigated with same. ✱Himro Cure (T.M. See 169003 and 25857) Bliss's Cure, and the Gre Mountain Cure resemble the above.

✱Ⓟ **Potter's Asthma Cure** (T.M. 444921, 507208) contains 30% Stramoni and 15% Lobelia.—P.J. i./28,528.

Ⓟ **Asthmatic Cigarettes** contain Stramonium treated with Nitre.

🇺🇸🇵 **Cigarettes d'Espic** are said to be made of the following ingredients Belladonna Leaves 5½, Hyoscyamus Leaves 2¾, Stramonium Leaves 2¾, *P landrium Aquaticum* 1, Opium Extract 1⅛, Cherry Laurel Water a sufficie and a little Potassium Nitrate.—Yeo.

✱Ⓟ **Dr. Blosser's Remedy** (T.M. 345235, 457723) (Cigarettes) conta 18·5% Stramonium.

Exibard's Abyssinian Powder contains plant powders and balsams.

✱**Garfield's Tea** (T.M. 282807, 91086) is stated to contain:—

Senna 30%, Couch Grass 33%, Balmony 20⅔%, Dandelion 3%, Centaury Pellitory 3%, Mallow 3%, Chamomile ⅓%, Hyssop 3%, Peppermint 1%.

Potassii Sulphas (*B.P.* '14). K_2SO_4=174·278.

Dose.—15 to 45 grains (**1 to 3 Gm.**).

Colourless crystals with Saline, slightly bitter taste.

Foul smelling evacuations treated by Calomel $\frac{1}{6}$ to $\frac{1}{4}$ grain at night, followed in the morning by a dose of this.

Potassium Sulphate 0·25 to 0·5% added to local anæsthetics whether by spinal injection or peripheral blocking of nerves enhances anæsthesia.—Col. H. M. W. Gray, B.M.J. i./15,5.

Potassium Sulphocarbolate 10 grains in a *dose* as (above). Useful in gastric and intestinal fetor.

Potassii Nitris. KNO_2=85·108. *Dose.*—$\frac{1}{4}$ to $1\frac{1}{2}$ grains (**0·016 to 0·1 Gm.**).

A crystalline deliquescent powder. It is a vasodilator, improves the cerebral circulation and is given for migraine, asthma and epilepsy.

Pulvis Potassii Nitritis Compositus.

Potassium Nitrite $\frac{1}{2}$ grain, Potassium Nitrate 18 grains, and Potassium Bicarbonate 25 grains; mix and dispense in parchment paper. This dose may be given every morning in a tumbler of water to reduce blood pressure; is diuretic. Has thus checked recurrent epistaxis. Should be tried for gout.

Pulvis Sodii Nitritis Compositus.—Brunton.

Sodium Nitrite $\frac{1}{2}$ to 2 grains, Potassium Nitrate 10 to 20 grains, and sometimes Potassium Bicarbonate 10 grains—in a tumbler of water every morning—to reduce blood pressure. May be taken for years.

Potassii Phosphas. **Di-Potassic Hydrogen Phosphate.**

K_2HPO_4=174·2278. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).

A deliquescent granular powder; is given as an alterative in phthisis and urinary affections.

Potassii Phosphas Acidus. Di-Hydrogen Potassium Phosphate, Mono-Potassium Phosphate, KH_2PO_4=136·1358.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

Colourless crystals, readily soluble in water with acid reaction.

Sal Polychrestum. *Syn.* **Glaser's Salt.**

Dose.—30 to 120 grains (**2 to 8 Gm.**).

A mixture of Potassium Sulphite and Sulphate, has a sulphurous odour, has been given for dyspepsia and for chronic skin diseases.

Sal Enixum is Potassium Bisulphate. $KHSO_4$=136·1678.

Potassii Sulphocyanas (**Sulphocyanide**). *Syn.* Potassium Thiocyanate. KCNS=97·168.

Dose.—$\frac{3}{4}$ to 3 grains (**0·05 to 0·2 Gm.**). Not legally [ℙ 1] or (℗) but to be supplied with caution. Made by fusing Potassium Cyanide with Sulphur.

Has been employed as antispasmodic and anodyne—in phthisical cough and catarrh, dyspnœa, and mania.

Hypertension. *Dose.*—$1\frac{1}{2}$ grains in 1 drachm of water three times daily after meals for first week, twice daily for 2nd week, and once daily for 3rd week, and then daily or every other day.—L. T. Gager, Jl.A.M.A. i./28,84.

Good response. *Start the treatment cautiously.*—B.M.J.E. i./30,4.

Sedative and hypotensive in neurotic patients; relieves vertigo and other subjective symptoms. Prolonged treatment necessary.

4½ grains daily not effective, but 15 grains was.—M. H. Finebe B.M.J.E. ii./30,41.

There is no clear evidence as to its clinical value in essential hypertensi and its hypotensive effect is almost always *accompanied by distressing s reactions* (*weakness, fatigue, drowsiness, and gastro-intestinal symptoms*) whet given in large doses for short periods or small doses for long periods. Arter sclerosis a contraindication.—D. Ayman, Jl. A.M.A. i./31,1857. Both Sodi and Potassium Thiocyanates produced *very disagreeable side-effects.*—W. Egloff and Co-workers, *ibid.* 1942.

Exfoliative dermatitis following use of 1½ grains th times daily for a week.—C. R. Weis, Jl. A.M.A. ii./29,988. Acute diffu erythematous dermatitis caused.—B.M.J.E. ii./29,96.

See also Sodium Sulphocyanide.

Tooth Powders, Pastes and liquid Dentrifices. Suggested use of t or other alkaline sulphocyanide in neutral media. For powder 1 to 14 precipitated chalk. For liquid dentifrice 1 to 8 of alcohol. Subject of pat —F. J. Rhodes, No. 20879 of 1914.—P.J. ii./15,362.

Potassii Tartras.—Normal or Neutral Potassium Tartrate.

$(CHOH)_2COOK.COOK, \frac{1}{2}H_2O. = 235{\cdot}239.$

Dose.—30 to 240 grains (**2 to 15 Gm.**).

Crystalline powder with bitter taste made by neutralising Ac Potassium Tartrate with Potassium Carbonate. Has purgative a diuretic properties.

Soluble.—About 5 in 3 of water.

Potassii Tartras Acidus. (*B.P.* '14). *Syn.* **Potassii Bitartr** Purified Cream of Tartar. $(CHOH)_2COOK.COOH = 188{\cdot}1$

Dose.—15 to 60 grains (**1 to 4·0 Gm.**).

The crude tartar deposited during the fermentation of wine— crystallised. A white powder with acid taste soluble 1 in 200 water. Diuretic and cathartic. Is employed in acute renal disea Where the urine is thick and alkaline, this salt neutralises and p duces normal appearance.

Puerperal Eclampsia.—The convulsions may be the signs of œdema of brain, hence aim at treating the œdema rather than the defect of the kidne Very small frequent doses of Potassium Bitartrate caused increased diur in a case and effected cure of eclampsia.—B.M.J.E. i./13,70; B.M.J. i./13,12

Haustus Imperialis, K.C.H., **Imperial Drink.** Potassium Bit trate and Tartaric Acid of each 1 ounce, Sugar 16 ounces, Lem Oil 12 minims, Boiling Water 1 gallon.

Carbuncle on the neck was treated by Cream of Tartar Powder a dressing. Renewed from time to time and irrigated with sterile wat

Potus Imperialis, G.N.C. Lemon Syrup 1½ ounces, Acid Tartra of Potassium 1 drachm, Water to 20 ounces.

Potassii Boro-Tartras. Soluble Cream of Tartar.

Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

An amorphous white powder. Potassium Acid Tartrate 5, Bor 2. Dissolve with heat in water, *q.s.*, and evaporate to dryness.

Soluble to extent of 1 in 1 of water.

Uses.—Similar to that of Cream of Tartar.

Epilepsy has been treated with it—as much as 3 Gm. daily, sometir combined with Bromide.—B.M.J.E. i./22,57; L. i./22,446.—*Cf.* Sodi Borate.

Better results when combined with Gardenal than with either separat commencing with 1·5 Gm. Borotartrate and 0·15 Gm. Gardenal daily in th doses, continued for 3 years.—B.M.J.E. ii./29,85.

QUINIDINE, CINCHONIDINE, CINCHONINE AND CINCHONA FEBRIFUGE.

The **Medical Research Council,** Special Report No. 96, 1925, concluded that Quinidine *is at least as efficacious as Quinine in malaria.* There is no indication of a preferential action of Quinidine on benign tertian, or of Quinine on subtertian infections. The depressant action of Quinidine on heart muscle may, however, limit its use. A mixture of the crystallisable Cinchona alkaloids might replace Quinine and be of great value as well as being cheaper.—B.M.J. ii./25,488. L. ii./25,510. C. & D. ii./25,434.

Curative effects of Quinine, Quinidine, and Cinchonine found the same for all forms of malaria and, except for the greater cardiac depression caused by the last, no difference in toxicity.—Dale and James (First Internat. Malaria Conf., Rome). B.M.J. ii./25,970.

These findings negative, in part, the opinions of Hugh W. Acton (L. i./22, 124,283) that all the various (14 or more) closely related alkaloids in Cinchona Bark exert a destructive action on the malarial parasite, but differ in the degree of destructive power. According to him, in *benign tertian* infection dextro-rotatory Quinidine is more efficacious than the lævo-rotatory Quinine.

In a previous paper (L. i./20,1257) Maj. Acton pointed out that malarial fever should be regarded, not as one disease, but a group of three different fevers due to three distinct parasites, and two at least of these, in his opinion, require different alkaloids of Cinchona Bark.

Cinchona Febrifuge as produced in India for the last 50 years from 'Red Bark' has contained: Cinchonidine 40, Cinchonine 30, Quinine 20, Amorphous Alkaloids 10.

Cinchona Febrifuge Tablets contain 4 grains of the mixed alkaloids.

Useful in benign tertian fevers, but might be better borne and more effective if Quinine and the useless and toxic alkaloids were left out. The Quinine could be added to treatment, if desired.—S. M. Klages, Dec., 1927.

Quinidine Sulphate, 10 grains *per os* twice daily for 21 days, gave cure percentage 62·9, and Cinchonidine Sulphate 63·1. The efficacy of the total alkaloids is thought to be dependent on the **Quinidine** content or the **Cinchonidine** and **Quinidine** combined.

Maj.-Gen. Hehir finds benign tertian forms probably *over* 75% of cases met with, and not 50%.—L. i./20,1382.

The products of Cinchona in the treatment of malaria.—B.M.J. i./26,154.

The following formula is said to be superior to any other in prophylaxis and superior to Quinine in chronic cases of malaria fever as a remedial measure: Powdered Cinchona Febrifuge 10 grains, Citric Acid 20 grains, Magnesium Sulphate 20 grains, Spirit of Anise 10 minims, Syrup to ½ ounce. Dose, ½ ounce 2 hours after meals.—T. H. Bishop, I.M.G., Dec., '24,644; *ibid.* April, '25,193.

Benign tertian malaria well treated with a similar mixture. Cheap and suitable for mass treatment.—O. A. R. Berkeley-Hill, I.M.G., July, '26,333.

Cinchona Febrifuge. Warning against deficiency in alkaloids or presence of harmful ones.—L. i./23,148.

Standardisation of Cinchona Febrifuge.

In recent years C. Ledgeriana has been encouraged (to increase Quinine production) at the expense of the other alkaloids. Recent samples of Cinchona Febrifuge suggest they have been made from C. Ledgeriana after the extraction of the Quinine, and they contained greater amounts of Amorphous Alkaloids and Quinidine. Although it is believed that Cinchona alkaloids have equal anti-malarial action it is important to have a definite standard.—B.M.J. i./30,27.

Still a variable product.—D. Hooper, P.J. i./29,631.

Details of Public Analyses and a modified Howard and Chick estimation process.—J. A. Goodson and T. A. Henry, Qtrly. Jl. Ph., '30,238.

Hydroquinine is the most active of the alkaloids on bird malaria, follow by Quinidine, Quinine, Cinchonidine and Cinchonine in descending or Separation of the Quinine is wasteful from the economic standpoint. Ther no reason why Cinchona Febrifuge should be so varied in composition Goodson and Henry, Qtrly. Jl. Ph. iii./1930,238, see also B.M.J. ii./30,969

Totaquina, containing 70% Cryst. Alks. of which not less than 15 Quinine, suggested by Malaria Comn., R. Socy. Trop. Med., June 16,'32

Quinidina. $C_{20}H_{24}N_2O_2$=324·2032.

When crystallised from Alcohol, the base contains 1 molecu Alcohol of crystallisation. The Alcohol is completely removal at 120° C. Quinidine free from water and Alcohol melts at 168° When crystallised from boiling water it contains $1\frac{1}{2}H_2O$.

Quinidine is soluble 1 in 2,200 in water, 1 in 750 boiling water, 1 30 Alcohol 90%, 1 in 20 Ether.

Its solution in Sulphuric Acid has a blue fluorescence, as in t case of Quinine, and it gives a similar Thalleioquin reaction. differs from Quinine in M.Pt., and its Acid Tartrate and the Hyd odide are only slightly soluble.

Quinidinæ Sulphas. U.S. X., Ph. Ned. V., F.E. VIII., P. Belg. I $(C_{20}H_{24}N_2O_2)_2.H_2SO_4+2H_2O$=782·5132.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). U.S. X. states 5 gra four times a day as average. Slipule No. 00 holds 6 grains. F auricular fibrillation an average is 6 grains (**0·4 Gm.**), thrice daily.

Occurs as needle crystals, ***soluble*** about 1 in 100 in water.

Uses.—In addition to its efficacy in malaria, Quinidine, alone in combination with Cinchonidine (*vide* Preparations *infra*) shou be tried in all forms of fever, and wherever Quinine has been us hitherto, *e.g.*, in influenza, neuralgia, nervous headache, comm catarrhs and as a general tonic.

Quinidine undoubtedly superior to Quinine Hydrochloride in cases wh resist Quinine.—Hans Ziemann, per Chininum, 72.

Quinidine is believed to be specific in ***auricular fibrillation.***

References to treatment of Auricular Fibrillation.

By FIBRILLATION is meant an incoordinated, tremulous and flicke ing movement of the muscular wall of the auricles, which is in a sta of continual agitation. The fibrillating auricles might be compare with the weak fibrillary twitchings which occur in the muscles the body when they are undergoing paralysis and atrophy. Th fibrillations of the auricles may amount to as many as 500 a minute the ventricular rate may be 120, 140 or even 200 in rare cases. Ma of the impulses fail to excite any ventricular contraction.

Tinct. Digitalis 10 minims every 4 hours or 15 minims every 6 hours shou be given daily, carefully watching the effect by counting the pulse twice a d by auscultation. One should endeavour to find the daily quantity necessa to keep the heart about normal rate. Some patients feel best when t heart's rate is kept as low as 50.—C. H. Cattle, B.M.J. i./21,521. See al Oliver-Sharpey Lecture by Thomas Lewis.—*ibid.*, 551.

Auricular flutter associated with arrhythmia perpetua or delirium cor treated by Quinidine. In one case 15·5 Gm. had to be given before t arrhythmia could be controlled. Usual dose to begin with, 0·3 Gm.—slow increased. As mu ch as 2 to 3 Gm. can be given in 24 hours.—B.M.J.E. i./21,8

A study of 400 cases.—D. S. Brachman, L. i./21,374.

Quinidine Sulphate thought to have definite power to terminate paroxysms by restoring normal rhythm. The percentage of successful cases has varied up to 66%. A record of 13 cases. Dose 0·4 Gm. given in gelatin capsules, thrice daily is sufficient to ensure a progressive retardation of auricular rate for the first few days. Majority of successfully treated cases re-established normal mechanism. Quinidine has a remarkable action on the auricle and the action is of a potent nature.—A. N. Drury and C. C. Iliescu, B.M.J. ii./21,511—515.

Auricular fibrillation of itself not a dangerous or serious disease. Quinidine not free from danger.—J. Mackenzie, B.M.J. ii./21,576.

Return to normal cardiac rhythm in some cases. Its use is not without danger, the risk of embolism being a real one. Bibliography of the method.—A. W. M. Ellis and A. E. Clark-Kennedy, L. ii./21,894.

Dose of 2 to 3 Gm. *p.d.* One patient died.—J. Hay, B.M.J. i./22,564.

Rhythm restored. Commence with moderately large dose—1·25 to 1·5 Gm. *p.d.* for 3 or 4 days. If beat becomes regular 1 Gm. *p.d.* for one or two weeks, then Digitalis and Quinidine alternately for 4 or 5 days.—B.M.J.E. ii./22,1. See also J. Hay and others, B.M.J. ii./22,1079. Sometimes without the patient being conscious of it. Small doses should be given.—B.M.J.E. ii./22,37,74.

In paroxysmal tachycardia it has little or no effect. In auricular flutter likely to prove of value. In a small proportion of cases with established auricular fibrillation Quinidine restores rhythm.—J. Parkinson and J. W. McK. Nicholl, L. ii./22,1267.

Successful, but not suited for extensive structural changes in the heart, especially if response to Digitalis is not good.—F. R. Fraser, B.M.J. i./23,507.

The dosage of Frey—six grains is given the first day, two doses the second, three the third and so on till a maximum of 10 doses may be reached. The majority of cases are restored on the second, third or fourth day. The dose is repeated every two hours, starting at 5 a.m. Pulse recorded hourly.—J. G. Emmanuel, L. i./23,1050.

In over 50% of cases Quinidine restores the rhythm temporarily, but only in a much smaller number is the action permanent. When fibrillation is due to abnormal rhythm, Quinidine therapy may be highly satisfactory, but when the myocardium is severely and permanently damaged control of the ventricular rate by Digitalis is of more benefit than restoration of normal rhythm. To the patient fully Digitalised (by massive oral doses) 3 grains of Quinidine are given, followed, if no idiosyncrasy after 12 hours, by 6 grains every 3 hours for 5 doses. When necessary, the procedure is repeated on two following days. If the normal mechanism is not then restored further treatment is not likely to give a permanent result. Quinidine tends to increase the ventricular rate, but Digitalis may be given simultaneously to counteract this.—J. C. Bramwell, L. i./25,1043.

In heart affections in old persons predisposed to polyuria, Quinidine was found to be diuretic.—L. ii./26,924.

The treatment is difficult and is best undertaken with electrocardiographic control, as toxic effects on the heart are fairly frequent. A dose of 6 grains every 2 hours for a maximum of 5 doses to normal rhythm, then 1 grain thrice daily for 6 to 12 weeks, first reducing the pulse frequency to between 80 and 100 while at rest in bed.—G. J. Langley, B.M.J. i./27,1043.

Of 27 cases definite and lasting benefit was obtained in 9. Having got the patient fully Digitalised give a preliminary dose of 0·2 Gm. Quinidine : 24 hours later give 0·4 Gm. and repeat every 2 hours for 5 doses or till normal rhythm returns—if necessary, another 5 doses may be given on each of the two succeeding days. When first relapse occurs give a holding dose of 0·4 Gm. *p.d.* for 4 to 6 weeks, and half that dose for the next 2 or 3 months.—J. C. Bramwell and R. Ellis, L. ii./28,966.

TACHYCARDIA.—Quinidine Sulphate the only therapeutic measure and successful in many cases. Dosage high—as much as 120 grains daily.—M. B. Strauss, Am. Jl. Med. Sci., '30, per M.A., '31,51.

Quinidine Sulphate Slipules and Tablets; 5 grains (**0·3 Gm.**) and 6 grains (**0·4 Gm.**) are made.

Elixir Quinidine. *Martindale.*

Contains 10 grains (**0·6 Gm.**) per ½ ounce (**15 Cc.**) dose (*cf.* also **Elixir Quinidine-Cinchonidine**).

Quinidinæ Sulphas Acidus. $C_{20}H_{24}N_2O_2.H_2SO_4+4H_2O=494{\cdot}341$.
Colourless crystals, ***soluble*** 1 in 8 in water.

Quinidinæ Hydrochloridum. P. Ital. V. $C_{20}H_{24}N_2O_2.HCl+H_2O=$ 378·6836.
Colourless silky crystals, soluble 1 in 60 in water (according to ou experiments).

Quinidinæ Hydrochloridum Acidum. $C_{20}H_{24}N_2O_2.2HCl+H_2$ $=415{\cdot}1484$.
Colourless crystals, soluble 1 in 4 in water.

Sterules Quinidine Acid Hydrochloride.
5 grains (**0·3 Gm.**) in 75 minims (**5 Cc.**), also 10 grains (**0·6 Gm** in 150 minims (**10 Cc.**), for *intravenous* use, and 5 grains (**0·3 Gm** in 30 minims (**2 Cc.**) for *intramuscular* injection.
Quinidine compounds have been given intravenously in hear affections. This compound, by reason of its solubility, is suggeste for intramuscular injection both in malaria and heart affections.

Quinidinæ Periodidum. $C_{20}H_{24}O_2N_2.2I=578{\cdot}0672$.
Dose.—$1\frac{1}{2}$ to 3 grains (**0·1 to 0·2 Gm.**), increased if necessary.
When made by the interaction of Quinidine and Iodine in suitabl solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a orange powder containing 56·1% Quinidine, according to investiga tions in the author's laboratories (1923).

Pharmacology :—
This Periodide is largely split up by Physiological Acid (39% of the Periodid being liberated), while a further 12·7% (of the Periodide) is rendered free b subsequent treatment with Physiological Alkali.
$1\frac{1}{2}$ grains produced no noticeable effect. A 3 grain dose, however, cause free perspiration 4 to 5 hours after taking, together with feeling of cold.
Soluble in Chloroform, slightly soluble in Alcohol, almost in soluble in Ether, insoluble in water.
Uses.—This form of Quinidine may be of use for the treatment o auricular fibrillation of the heart, and it is well worthy of trial i benign tertian malarial infection, in comparison with the 'ordinary Quinidine and Cinchonidine preparations.
In the steadying of rapid heart in hyperthyroidism used with great effect.— F. S. A.
Dispensing Note. To be given alone, in cachet or 'slipule,' prefer ably after food.

Cinchonidina. $C_{19}H_{22}N_2O=294{\cdot}1876$.
Usually, in commerce, in small colourless leaflets, with M.pt 202·5° C. ***Soluble*** about 1 in 4000 of water, and about 1 in 20 o Alcohol. It does not give the Thalleioquin reaction, and its solution in Sulphuric Acid is not fluorescent.

Cinchonidinæ Sulphas.—$(C_{19}H_{22}N_2O)_2H_2SO_4,\ 3H_2O=740{\cdot}4976$ (From alcohol crystallises with $2H_2O$.). *Dose.*—1 to 10 grains. In silky white needles from mother liquor of Quinine Sulphate. ***Soluble*** 1 in 60 of Alcohol, 1 in 100 of water (more so with a little acid).
Uses.—Therapeutically, in malaria, this has properties on a par with Quinidine. It has been used in other forms of fever, and in neuralgia, and otherwise as Quinine.
Slipules and Tablets 5 grains each (**0·3 Gm.**) are made of this salt.

Elixir Cinchonidine. *Martindale.* Contains 10 grains (**0·6 Gm.**) per ½ ounce (**15 Cc.**) dose.

Elixir Quinidine—Cinchonidine. *Martindale.* Contains 5 grains of each per ½ ounce dose.

Cinchonidinæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl+H_2O=348·668$.
Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).
Colourless crystals, soluble 1 in 30 in water.

Cinchonidinæ Hydrochloridum Acidum. $C_{19}H_{22}N_2O.2HCl + H_2O=385·1328$. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).
Crystals readily soluble in water.
Sterules for *intramuscular* injection, 7½ grains (**0·5 Gm.**) in 23 minims (**1·5 Cc.**).

Cinchonidinæ Periodidum. $C_{19}H_{22}N_2O.4I=801·9156$.
Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) increased.
When prepared by the interaction of Cinchonidine Base and Iodine in a suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a brownish-red powder, containing 36·7% Cinchonidine.

Pharmacology :—
According to our experiments it is not markedly split up either by Physiological Acid or subsequent treatment with Physiological Alkali, differing in this respect from both Quinine and Quinidine Periodide. It was prepared in the writer's laboratories (1923).
1½ grains gave no noticeable effect in a normal. A 3 grain dose, however, caused free perspiration 4 to 5 hours after taking, together with feeling of cold.

Solubility.—Slightly soluble in Chloroform; almost insoluble in Alcohol and Ether. Insoluble in water.
Incompatible with alkalis, salts of metals and as alkaloids.
Uses.—The body may have a field of utility (*e.g.* in malarial infection) especially in cases where other 'Bark' compounds have been found ineffective or badly tolerated. The content of Iodine (63·3%) renders it suitable for administration in conditions where Iodine is efficacious. It may prove of service in influenza.
Dispensing Note.—It is preferably given, finely powdered, alone in cachet or 'slipule' (No. 1) after meals.

Cinchonidinæ Salicylas. $C_{19}H_{22}N_2O.C_6H_4OH.COOH=432·2344$. Is useful as a tonic and antiperiodic in neuralgia, rheumatism, sciatica, etc. 5 grains every 2 hours in Slipules (No. 00) or cachets.

Cinchonina. $C_{19}H_{22}N_2O=294·1876$.]
Dose.—1 to 10 grains.
Cinchonine salts are the cheapest of the alkaloidal salts of Cinchona. Their nauseous bitter taste is objectionable, though as prophylactics some have thought them superior to quinine.
Idiosyncrasy to Quinine. A lady had had 30 grains of the Bihydrochloride intramuscularly daily for three days, and subsequently 45 grains daily *per os.* This produced dermatitis. She could, however, take Cinchonine base, 16 grains a day.—W. Fletcher and E. A. O. Travers, B.M.J. i./23,629.
Cinchoninæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl.2H_2O=366.6836$.
Dose.—1 to 10 grains or more.
In white acicular crystals, soluble 1 in 30 of water and 1 in 2 of alcohol 85%. (Commercial samples we find vary.)
Cinchonine Acid Hydrochloride. $C_{19}H_{23}N_2O.2HCl=367·1172$.
Solution 1 in 2 by intramuscular injection—dose 7½, 10 or 15 grains—or the Acid Hydrobromide in malaria equal to or better than quinine.—Sir L. Rogers B.M.J. ii./18,459.

Cinchoninæ Sulphas. $(C_{19}H_{22}N_2O)_2H_2SO_4 2H_2O = 722{\cdot}482$.
Dose.—1 to 10 grains or more.
In hard, colourless, short rhombic prisms with a vitreous lustre. Soluble in 70 cold water, 1 in 10 alcohol 90%. Dilute solution in Dilute Sulphuric Acid should not be markedly fluorescent (absence of Quinine and Quinidine).
Cinchoninæ Sulphocarbolas. $C_{19}H_{22}.N_2O.C_6H_4.SO_2H.OH$ (?) $= 468{\cdot}294$.
In reddish white needles. Antiseptic febrifuge.
An examination of the polarimetric rotations of concentrated solutions of acid salts of the Cinchona alkaloids showed that when heated at 126° C. for 2 hours decomposition took place rapidly in the Bisulphate of Quinine, Quinidine, Cinchonidine and Cinchonine. The *Bi-hydrochlorides*, however, Quinine and Quinidine were unchanged and of Cinchonidine and Cinchonine only very slightly decomposed at the same temperature. The acid sulphates were completely altered by 4 hours heating at 141° C., whereas the corresponding hydrochlorides were effected to the extent of 0·4% in the case of Quinine, ranging to 7·7% with the Cinchonine.
Doubt is expressed as to the toxicity of Quinicine and Cinchonicine.—B. B. Howard and O. Chick, B.P. Conf., 1923 : P.J. ii./23,92.
Quinetum. This name has been applied variously in the past. It should be used for the mixture of *amorphous* bases of Cinchona Bark, the crystallisable alkaloids having been previously removed.

QUININA.

Fr. Cx., P. Hung., P. Svec., U.S. X., F.E. VIII.

$C_{19}H_{20}N_2O.CH_3.OH + 3H_2O = 378{\cdot}25$. **Ph. Ned. V.** is anhydrous.
Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) or more (if anhydrous, ·8 parts equal approximately 4 of sulphate). *Antimalarial Dose* (*U.S.*) 15 *grains daily.*
Quinine base can be produced with 1, 2 or 3 H_2O.
It forms additive compounds with Hydrocarbons, *e.g.*, 1 molecule Quinine + 1 molecule C_6H_6. A body has also been made consisting of 2 molecules Quinine, 1 molecule Hydrocarbon and $2H_2O$. Combinations with Amyl Acetate, Ethyl Acetate, Toluol, Dimethylaniline and Nitrobenzol also with Essential Oils, *e.g.*, Lavender, Pine, Rosemary, also with Terebene, Terpineol have been made.—Schaefer, 8th Int. Cong. App. Chem., N.Y., Sept., 1912.
Soluble.—Slightly in water (1 in 2,600), 1 in 40 of ether and about 1 in 1 of alcohol 90%, also in dilute acids, 1 in 3 of chloroform and in aqueous ammonia. Antipyrin increases its solubility in water. Its solution in diluted sulphuric acid is fluorescent, lævogyrate, and gives, with chlorine water and ammonia afterwards added, a green colour due to **Thalleioquin.**
Uses.—The most valued Cinchona alkaloid, in white powder. It is not so bitter as its salts, hence may well replace them.
It is readily absorbed by the acid of the stomach, and quite as effective as the salts. It can be detected in the urine 10 minutes after taking. In wasting diseases, *e.g.*, tuberculosis, Quinine retards protein breakdown and may be prescribed with advantage.
Quinine and Sodium Bicarbonate Tablets, 3 grains (**0·2 Gm.**) each.
Quinine (base) acts more promptly and powerfully than an equal weight of any of the salts and is less disturbing to the stomach. Tablets would disintegrate more readily if prepared with Sodium Bicarbonate (3 grains of each), which would also help to counteract acidosis in hæmoglobinuria.—S. M. Klages, Dec., 1927.
See also Quinine Hydrochloride, Sulphate, etc., and p. 737, *for malaria treatment.*

Tercentenary Cinchona Celebration. See Cinchona.

While the production of ***synthetic Quinine*** would undoubtedly be a triumph for organic chemistry, the more economic method of production will lie in the proper utilisation of the Cinchona plant. A plea for an experimental station.—Prof. Greenish, L. ii./22,236. It has been synthesised, but at present the synthetic is more costly than the natural.

PRODUCTION.—Dutch data. The present production it appears is in excess of commercial demands, though millions are suffering from malaria owing to lack of Quinine.—B.M.J. i./25,700.

The total present world-production of Quinine is 600,000 Kg. per annum, made in 14 factories, and it is doubtful whether this is sufficient for the world's needs. Question as to possibility of increasing supply should be seriously considered.—Health Committee, League of Nations, L. i./24,720.

Our Dominions are unable to produce all the Cinchona Bark and its alkaloids required.—Sir D. Prain, P.J. ii./27,9.

EXTRACTION OF QUININE AND STRYCHNINE from solutions of varying Hydrogen-ion concentration.—N. Evers, P.J. ii./22,90.

Fatty compounds of Cinchona alkaloids used to destroy and keep clothes free from moths, usually by soaking or spraying with a Petroleum or Carbon Tetrachloride solution. Used in dry-cleaning plants in U.S.—P.J. ii./27,580.

Acidum Quinicum. *Syn.* KINIC ACID.

$C_6H_7.(OH)_4COOH+H_2O=210{\cdot}1092$.

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

An acid contained in Cinchona, principally combined with the alkaloids and with calcium, forms white crystalline masses, soluble in water about 5 in 6, and in alcohol 90% 1 in 35. It is decomposed into hippuric acid in the system. This and **Lithium Quinate** in similar dose are used in gout and rheumatism.

℞ **Quininæ Cacodylas.** $C_{20}H_{24}N_2O_2.(CH_3)_2AsO_2H=462{\cdot}1878$.

Dose.—*Per os* and hypodermically, 1½ to 4 grains (**0·1 to 0·25 Gm.**).

This salt has been suggested for intravenous use in malaria, 7½ grains (**0·5 Gm.**) in 20 Cc. It has approximately the same toxicity as Quinine Acid Hydrochloride and Acid Hydrobromide.

Quininæ Camphoras.

$2(C_{20}H_{24}N_2O_2).C_8H_{14}(COOH)_2=848{\cdot}5312$. *Dose.*—1 to 10 grains. An insoluble powder. Contains 76·4% Quinine.

Quininæ Citras.

$2(C_{20}H_{24}N_2O_2).C_3H_4.OH(COOH)_3+7H_2O = 966{\cdot}578$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Soluble 1 in 900, has, therefore, little taste. Given suspended in mixture. Contains 67·1% Quinine.

Ferri et Quininæ Citras (*B.P.* '14).

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, or in pills with simple syrup or mucilage of acacia (not in excess, as, unless made very hard, they lose shape). Alcohol 60% with Glycerin 5% is also a suitable excipient. Contains about 15% of quinine, in greenish deliquescent scales. It has an agreeable bitter, chalybeate taste. Largely used as a general tonic.

Incompatible with Tannin and Alkalis, also with Phosphoric Acid (Ferric Phosphate may be thrown out), unless considerably diluted prior to mixing.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold dose), Syrupus Zingiberis.

Effervescent Citrate of Iron and Quinine.

Dose.—1 drachm (**4 Gm.**) = 3 grains of the salt.

Tablets of Iron and Quinine Citrate 3 grains.

Syrupus Ferri et Quininæ Citratis.

Dose.—1 drachm (**4 Cc.**). 1 in 20 of Orange Syrup.

℞ **Ferri Quininæ et Strychninæ Citras** (*q.v.*) contains 1% of Strychnine.

℗ **Sirop Neurotonique.**

Dose.—2 to 3 drachms (**8 to 12 Cc.**) in a little water after meals. Iron and Quinine Citrate 0·50, Strychnine Nitrate 0·01, Liquid Extract of Kola 5·0, Sodium Glycerophosphate 5·0. Dissolve with slight heat in Orange Syrup, *q.s.*, to 100.

Quininæ Formas Acidus (**"Neutral"** in France).

$C_{20}H_{24}N_2O_2.(H.COOH)_2 = 416·2344$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Long white needles containing 77·9% Quinine, M.pt. 95° C.

Quininæ Formas Neutralis (**"Basic"** in France). *Syn.* CHINOFORM, QUINOFORM. $C_{20}H_{24}N_2O_2.HCOOH = 370·2188$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). Subcutaneously 1 to 3 grains. (Stated not to be painful.)

Prepared by using a very small quantity of water, in which the Quinine is placed and the acid added. Crystals melting at 132° lævorotatory. Contains 87·5% Quinine. A general tonic. Suitable for hypodermic use.

Solubility.—Varies according to conditions of manufacture. Some commercial samples we found were only soluble in 600 of water and 110 of Alcohol. We found that a 1 in 20 solution can be made extemporaneously by dissolving 1 gram of the base in 19 Cc. of water containing 0·125 gram of Formic Acid, but we could not make the salt more soluble than 1 in 55 of water and 1 in 7 of Alcohol, there being dissociation.

Sterules, Hypodermic, $\frac{1}{3}$ grain (**0·02 Gm.**) and $\frac{3}{4}$ grain (**0·05 Gm.**).

Guttæ 1 in 50 have been employed satisfactorily in asthenopia.

Quininæ Hydrobromidum, U.S. X., P. HELV., P. BELG. IV. FR. Cx. and P. ITAL. V. term this 'Basic' Quinine Hydrobromide.

Syn. **Quinine Bromide.** $C_{20}H_{24}N_2O_2.HBr + H_2O = 423·1426$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more. *Antimalarial Dose* (U.S.)—15 grains daily.

White acicular crystals, soluble 1 in water 40. (P. Helv. 60; Belg '50 to 60.')

Contains 76·6% of Quinine. Quinine is given with an excess of hydrobromic acid to lessen the cinchonism sometimes caused by large doses. Is valuable in acute rheumatism. In malaria for oral administration, hypodermically or intravenously.

EXOPHTHALMIC GOITRE has been treated by 5 grain Capsules given to the limit of tolerance (3 or 4 Capsules *p.d.*)—for months or even years.

In 2½ grain doses thrice daily one of the best treatments.—J. B. Alexander, Clin. Jl., Aug. 15, '23,394. See also Quinine Sulphate.

Tablets contain 3 and 5 grains, also 3 grains, **with Phenacetin,** 5 grains. **Hypodermic Tablets** of the Salt contain ½ grain.

Tropical abscess has been treated by aspirating and injecting into the cavity 1% solution of this Salt.

Quininæ Hydrobromidum Acidum. (Fr. Cx.—'Neutral.')
$C_{20}H_{24}N_2O_2.2HBr+3H_2O=540{\cdot}1076$.
Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.
In yellowish rectangular prismatic crystals, or in powder. Contains 60% of Quinine.
Soluble 1 in 7 of water, and is well adapted for hypodermic injection. It is non-irritating. The additional hydrobromic radical tends to prevent quinism.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**)

Injectio Quininæ Hydrobromidi Acidi Hypodermica. 2 grains in 1 Cc. *Dose.*—$\frac{1}{2}$ to 1 Cc.
Used where quinine cannot be borne by the stomach. In malarial fever and subsequent rheumatism.

Quininæ Hydrochloridum. *B.P.* '14. U.S.X., P. Helv., P. Jap., P. Hung., P. Ital. V., Ph. Ned. V., P.G. VI. In F.E. VIII., P. Belg. IV. and Fr. Cx. termed 'Basic.' *Syn.* Quinine Hydrochlorate.
$C_{20}H_{24}N_2O_2.HCl+2H_2O=396{\cdot}6992$.
Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**). *Slipule* No. 0 holds 5 grains. F.E. has max. daily dose 2 Gm.

This salt contains 81·7% base against 73·5% in the sulphate.

Soluble 1 in 40 of water, 1 in 3 of 90% alcohol.
Two salts with a common ion lessen each other's solubility. The less solubility in Ringer's Solution (1 in 110) is due to its slight alkalinity, also to the fact that it contains a slightly greater number of Chlorine ions.—J. H. Crawford, B.M.J. i./22,874.
Quinine Hydrochloride 2 with Antipyrin 1 will dissolve in 4 of water.
Incompatible—Similar to Quinine Sulphate.

Uses and References—
It is sometimes better tolerated than the Sulphate. Subcutaneous or intravenous injections useful where not tolerated by the mouth. **Giemsa's Injection** contains Quinine Hydrochloride 10 Gm., Water 18 Cc., Ethyl-Urethane 5 Gm. The volume of product is 30 Cc., so that 0·5 Gm. is contained in 1·5 Cc. of solution for injection. *See also* Quinine and Urethane, *p.* 734.
As a fever prophylactic quinine hydrochloride 3 grains with phenacetin 5 grains is largely used in Portugal.—Ph. Notes.
For the paroxysmal headache or neuralgia so common after malaria the following mixture is recommended :—Quinine Hydrochloride 3 grains, Tincture of Cimicifuga 5 minims, Citrate of Caffeine 2 grains, Spirit of Chloroform 10 minims, Compound Infusion of Orange to 1 ounce, twice daily.

Soluté de Quinine pour injection hypodermique.—Fr. Cx.
Quinine Hydrochloride 3 Gm., Antipyrin 2 Gm., Water to 10 Cc. Special instructions as to sterilisation are provided.
For use in Malaria, see pp. 738,739, *and for toxic effects, p.* 743.

In acute tonsillitis, Quinine internally and as mouth-wash useful; also with Dilute Nitric Acid in cachectic cases of vesicular stomatitis.
Wounds treated by Quinine Hydrochloride 1% solution as wet dressing, also 1/10% with 1/10% of Hydrochloric Acid as continuous drip. Active in

ridding heavily contaminated wounds of the gas bacillus. Quinine is especially effectual in a menstruum of pus.—K. Taylor, B.M.J. ii./15,923; L. i./17,294.

ANAL FISSURE treated by Quinine Hydrochloride packing (5 grains) and Quinine suppository. Granulation good.—H. G. Leyton, B.M.J. i./18,314.

Mistura Quininæ cum Ferro.

Dose.—½ ounce thrice daily in water 30 minutes after food.

Quinine Hydrochloride 30 grains, Tincture of Ferric Chloride ½ ounce, Glycerin 1 ounce, Water to 8 ounces.

Bad cases of secondary syphillis do well on this.

Lotio Quininæ Hydrochloridi R.O.H. 4 grains to 1 ounce. For corneal ulcers, *cf.* p. 730.

Tablets, 1, 2, 3, 4, and 5 grains.

Pessus Quininæ (flat shape).—3 to 5 grains of Quinine Hydrochloride in Theobroma Oil basis. A valuable remedy for leucorrhœa.

A solution of Quinine arrests the movement of spermatozoa.

Contraceptives.

The following is a resumé of the chemical substances and preparations of them used for the purpose of contraception, with statements as to their relative values :—

✱ **Bircon Tablets** (T.M. 500913) said to contain Chinosol, Zinc Sulphocarbolate, Sodium Bicarbonate and other suitable antiseptics and deodorants.—L. i./31,392.

Chinosol is believed by some to be injurious. The following statements have been made :—

As a few women apparently absorb sufficient Quinine to cause sleeplessness and slight digestive disturbances, a suppository of Chinosol in Cocoa-butter is recommended by The C.B.C. Med. Research Committee.—L. ii./27,42.

Chinosol in any medium is not tolerated by a considerable number of women. Its use frequently produces inflammation and discharge, whilst sterility is stated in one instance to have been caused by it. A Lactic Acid Pessary in conjunction with an occlusive pessary found most efficient.—Norman Haire, L. ii./27,143. *See also ibid.*, L. ii./27,256,308 and 360.

Koromex. A Lactic Acid Jelly used in conjunction with a pessary. The spermaticide alone only satisfactory in 66·8% of cases.—L. ii./29,1128.

A jelly containing Chinosol, Boric Acid and Lactic Acid best as spermicide. Contraceptives may not be sent by post in U.S.A.—L. ii./30,1352.

Effervescing Tablets.—These are employed to some extent abroad, but the evidence is that they are exceedingly uncertain for the purpose, owing to the fact that they do not readily dissolve, and hence fail to function.

✱ **Speton** (T.M. 462940) **Tablets** are an example of this type.

✱ **Semori Tablets** (T.M. 496938,496937)—froth-producing and germicidal.—L. ii./29,623.

Lactic Acid.—It is well known that the secretion of the vagina is acid, owing to the presence of 0·9% Lactic Acid, which is secreted by Döderlein's Bacillus. In the act of coitus, alkaline secretion is passed by the mucous membrane for the purpose of neutralising the acid. It has been suggested therefore to employ 1% of Lactic Acid to overcome this alkalinity.

Lactic Acid Pessaries for vaginal use, are prepared with Theobroma basis weighing 20 grains, or a larger size 8 Gm., containing 2% of Lactic Acid.

Lactic Acid Jelly of a non-greasy type contains also 1% Lactic Acid, together with a small proportion of Boric Acid and a minute quantity of Thymol as preservative.

Contraceptalene is a preparation of this kind.

Mercuric Chloride and **Formaldehyde** the most spermicidal substances out of 36 tested on guinea-pigs, the killing concentration of each being 1/256%. Hexyl Resorcin kills at 1/64%, soaps at 1/32%. Formaldehyde and Hexyl Resorcin, *inter alia*, likely as contraceptives. ***Quinine Bisulphate and Chinosol only kill at*** ½%.—The Spermicidal Powers of Chemical Contraceptives, J. R. Baker, Jl. Hygiene, Vol. XXXI, No. 2, April, '31,213.

Patentex, a contraceptive jelly, was found to be a Glycerole of Starch preparation, containing 20% Boric Acid, and

Metag, described as an improvement on Patentex, was found to consist solely of Tragacanth Mucilage and a trace of Boric Acid.

Quinine Suppositories are well known and are supplied as follows:—3 or 5 grains of Quinine Hydrochloride in either Theobroma or Gelatin mass.

Quinine Pessaries were found to fail in 71% of cases.

⁂**Rendell's Quinine Pessaries.** (T.M's. numerous.)

The Cocoa Butter is subject to a process of filtration, to eliminate fibrous matter. The Quinine also is filtered through Jap Silk.

Where Cocoa Butter hinders the action of Chinosol and Quinine on sperms a new fat called **Cocoala,** which is nearly odourless, has not this defect.—J. R. Baker, L. ii./31,325.

Schereschewsky's 40% Quinine Ointment holds a high position for disinfection against venereal disease in Germany. 1 in 1,000 Perchloride is reliable.—L. i./22,292.

Quinine and Chinosol have small spermicidal value. The mechanical action of Cocoa Butter of some value.—L. i./30,367.

Quinine Urea Hydrochloride Tablet 2 grains used in conjunction with Dutch cap—dissolved in a little water in it.—Helena Wright, L. ii./30,332.

Douches.—The following are recommended:—

(*a*) 1% Lactic Acid solution; (*b*) Normal Saline; (*c*) Vinegar, 1 drachm to the pint; (*d*) Potassium Permanganate, 1 in 4,000. Douching failed to prevent conception in 74% of cases.

See also Contraceptive Section, Report of the 5th International Neo-Malthusian and Birth Control Conference, 1922; Pr. July, '23,80. Also 'The Comparative Value of Current Contraceptive Methods' read at Internat. Kongress für Sexualforschung, Berlin, Sept. 16, '26.

Sterilisation of men and women described, also Dutch ring pessary—said to give little inconvenience.—Birth Control Conference, L. ii./22,195.

Birth Control and the State. C. P. Blacker says no really satisfactory contraceptive exists. Chemical preparations give no security.—L. i./26,766.

Modern methods of birth control are causing an increase of involutional insanity among women.—L. i./26,660.

Gräfenberg's Silver Ring Method.

A simple and efficient method of ensuring temporary sterilisation, consists of the introduction into the uterine cavity of a flexible ring of coiled silver wire (diameter 2—3 cm.), which is removed, and, if necessary, replaced after a year. After removal the woman is as liable to conceive as if it had never been used. The ring sets up a *non-inflammatory* hypertrophy of the mucous membrane, rendering it incapable of acting as a nidus for the ovum. Method harmless *in the absence of genital infection* and its value lies in the fact that its reliability depends on the skill of the medical attendant and not on that of the patient. Used by Grafenberg in 1,100 cases over 10 years without a single failure.—Norman Haire, B.M.J. ii./29,1134; see also i./30,45,129,726.

The method is *far from harmless.* In many cases it has been necessary to remove the ring owing to metritis and parametritis or persistent bleeding from the uterus.—Leunbach (Denmark), International Medical Group for the Investigation of Contraception (from Hon. Mrs. Farrer, 13, Lansdowne Crescent, London, W.), L. ii./30,1438.

Birth Control on trial. No method practically effective in the majority of cases.—Mrs. L. S. Florence, B.M.J. i./30,658.

Contraceptive action of pessaries with Cocoa Butter basis probably largely due to mechanical action, *i.e.*, the covering of the cervix with a thin film impeding the ingress of the spermatozoa.—L. ii./31,258.

A good germicide is not necessarily a good spermaticide.—J. R. Baker L. ii./30,1438.

Tinctura Quininæ (*B.P.* '14). *Dose.*—½ to 1 drachm (2 to 4 Cc.).

Quinine Hydrochloride 1, Tincture of Fresh Orange 50. A very agreeable form of taking small doses of Quinine. Hydrochloride of Quinine is used as first suggested by W. Whitfield.

Vinum Quininæ (*B.P.* '14). *Dose.*—½ to 1 ounce (**15 to 30 Cc.**).

Contains one grain of Quinine Hydrochloride dissolved in one ounce of Orange Wine.

The Customs and Excise Commissioners allow its sale without licence if:—(a) It is prepared in accordance with the B.P. '14 directions. (b) That sales are made only by duly qualified chemists and druggists; and (c) It is labelled to show that it is to be used as a medicine. The word "Dose" should appear on the label in bold type. This should not exceed the B.P. '14 dose—viz., ½ to 1 oz.—but the Board do not object to the use instead of the words "one or two tablespoonsful," or "half a wineglassful."

Quininæ Hydrochloridum Acidum. Quinine Di- or Bi-Hydrochloride. In Fr. Cx., P. Ital. V. and F.E. VIII. is termed 'Neutral' Quinine Hydrochloride. $C_{20}H_{24}N_2O_2.2HCl$= 397·1328.

N.B.—Fr. Cx. adopted the salt $+2\frac{1}{2}$ H_2O. Crystallised from alcohol the Salt contains alcohol and water of crystallisation. Left exposed to the air this loses its alcohol and the Salt changes to one with $2\frac{1}{2}$ molecules of water, becoming at the same time opaque.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**) *Antimalarial dose* (*U.S.*) 15 *grains daily.* ½ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically F.E. has max. daily dose 2 Gm.

In white or yellowish white crystalline crusts. *B.P.* '14 states in amorphous powder. Is claimed to be soluble 1 in 1 of water. Contains 81·6% of quinine.

Uses.—This is the most suitable salt for injections which have to be sterilised (*cf.* Bi-Sulphate), and it is considered the best salt for intravenous use in malaria, septicæmia, etc. The hydrochloric radical is not as irritating as the sulphuric to the stomach.

Intravenous Injection of Quinine Acid Hydrochloride.

Dose.—An average dose may be considered as from 4 to 15 grains (**0·25 to 1 Gm.**) though Sir L. Rogers, B.M.J. ii./17,381, states that 5 to 7½ grains commonly produces cinchonism, and some hold that neither the *intramuscular* nor the *intravenous* dose should exceed 5 grains (**0·3 Gm.**).

Dilution.—Some use an exceedingly dilute solution (*e.g.* as low as 1 in 300). Others advise even a 10% solution. Personally we recommend a medium of 1 in 40 or 1 in 50. Newton Pitt advised 4 grains (**0·25 Gm.**) in 150 minims (**10 Cc.**) *i.e.* 1 in 40. A. G. Phear found 10 grains in 300 minims (**20 Cc.**) saved many lives in Macedonia.

Rate of injection.—This, as with all intravenous procedure, should be slowly performed.

Danger of rapid intravenous injection of Quinine solution in malaria. There may be dangerous fall of blood pressure with concentrated solution. The whole problem turns on the amount of Quinine passing through the heart every second. The amount of Quinine injected into a vein at the bend of the elbow should not be more than 1/120th grain per second or ½ grain a minute. This will mean 10 grains will require 20 minutes. For Quinine Hydrochloride intravenous injection the solution should not exceed strength of 1 in 300—to be given at the rate of 10 Cc. per minute for patients

over 15 years of age. Half rate for children under 15. Tables showing effect on systolic, diastolic and pulse pressures after intravenous injections of dilute solutions of Quinine Bihydrochloride.—U. N. Brahmachari, L. ii./22, 175, Jl. Trop. Med., July 1/22,209-211.

For further details of intravenous use in Malaria, see p. 739.

A 5-grain tablet (uncoated) of Quinine Bihydrochloride daily just before dinner a fairly efficient prophylactic. Coated tablets practically useless, often being voided before the coating dissolves. Results of 20 years' residence in Sierra Leone.—W. Addison, B.M.J. i./32,263.

PNEUMONIA.—Treatment by Quinine Bihydrochloride intravenously (7 grains in 10 Cc.).—R. Kharegab, L. ii./25,626.

SEPTICÆMIA.—Five grains (**0·3 Gm.**) in 10 Cc. has been employed. See B. Ratten, B.M.J. ii./27,39.

PUERPERAL SEPSIS.—One or two injections of 10 grains produced good results.—P. Liston, B.M.J. ii./27,959.

Intravenously (at first) and intramuscularly (subsequently) Quinine Acid HCl 5 grains in 10 Cc. in puerperal fever. On the first 3 or 4 days one injection intravenously and subsequently intramuscularly.—S. G. Luker, B.M.J. i./30,261, see also 270 (with Strepto serum); see also A.C. Hill, *ibid.*

As local anæsthetic ½ to 1% solution (for mucous membrane a 10% solution may be applied with cotton wool) is injected into the tissue. —L. ii./10,840.

Quinine and all its derivatives are general protoplasmic poisons and in proportion as they exert this action they act as local anæsthetics.—W. E. Dixon and Premankur De, Jl. Ph. and Exp. Ther., Oct., '27,407.

TONSILLECTOMY.—As a local anæsthetic Quinine Hydrochloride ¾ grain in 2 drachms of water superior to 0·2% Cocaine (5 Cc.). A small amount of 20% Cocaine first applied.—E. J. Brown, Jl. A.M.A., July 28, '23,321.

CANCER.—Quinine often of value for relief of pain. Injection intramuscularly of 20—30 Cc. Quinine Bihydrochloride solution 10% every other day, and 1 Gm. *per os* on alternate days.—Per Chininum, 226.

Quinine Bihydrochloride (7½ grains intramuscularly) is a powerful inducer of leucocytosis, but it appears to have no advantage over Novarsenobenzol or Mercury, and injections are painful.—G. R. S. Thomas, L. i./25,1292.

Intramuscular injections given in large numbers without tetanus being caused (as result of muscle fibre necrosis). Pain does not occur unless some solution gets into the subcutaneous tissues. However, intravenous injections are more rapid and painless. 0·6 Gm. in 10 Cc. water.—M. S. Nawaz Ahmadi (Uganda), B.M.J. ii./30,621.

LIVER ABSCESS.—After exploratory aspiration repeated irrigation of an abscess cavity with Quinine Bihydrochloride 3 to 5 grains per ounce may render subsequent operation unnecessary.

CHRONIC CONSTIPATION.—Rectal use best—5 grain suppositories.—B.M.J.E. i./30,8.

Isotonic Quinine Acid Hydrochloride Solution contains 0·565 Gm. in 10 Cc.—P.J. i./12,357.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) also 3 grains (**0·2 Gm.**), 5 grains (**0·3 Gm.**) also 15 grains (**1 Gm.**) in 2 Cc. for ***Malaria*** also 4 grains (**0·25 Gm.**) in 10 Cc. and 10 grains (**0·6 Gm.**) in 20 Cc. for ***intravenous uses.***

Also **Sterules, Hypodermic of Quinine Acid Hydrochloride** 5 grains (**0·3 Gm.**) with **Antipyrin** 3 grains (**0·2 Gm.**).

Tablets 1, and 5 grains. **Tablets, Hypodermic,** 1, 2, and 3 grains.

Quininæ Hydrochloro-Carbamidum.—*Syn.* UREA-QUININE. U.S. X. (A variety is ✱**Nikalgin** (T.M. 366289.)—B.M.J. i./18,254.)

$C_{20}H_{24}N_2.O_2.HCl\ CO\ (NH_2)_2,HCl+5H_2O=547{\cdot}258.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In small prisms, soluble 1 in about 1 of water. Contains 59·2%

Quinine. Used hypodermically in malaria 2 to 5 grains and in cholera, in as large as 12 to 15-grain doses. The latter is U.S. X. hypodermically (one dose daily) as average.

As local anæsthetic analgesia persists for 4 to 6 hours, even to several days. Used in America for malaria in which marked anæsthesia was noticed at the site of injection, hence its trial as a Cocaine substitute. 3 to 5 Cc. hypodermically of 1% solution (up to 3% is harmless). In 10 to 30 minutes produces anæsthesia; at the same time it acts as a hæmostatic. Healing of wounds is, however, delayed owing to thickening of the edges due to fibrinous exudation. In operations on hæmorrhoids 2% solution has caused sloughing.

J. E. D. Jones writes us 5 Cc. of 1% solution injected to ease pain in a case of spinal injury. Anæsthesia was prompt and profound and lasted 2 days without ill effect afterwards—far superior to Cocaine and Morphine.

Painless operations. Results with Quinine Urea Hydrochloride and with Novocain.—P. Lockhart-Mummery, Pr., Feb., 1920.

In tonsilitis and in tuberculosis of the larynx 10% solution or less is suitable—even 20 or 50% may be used. Apply by spray, sponge, brush, etc. A teaspoonful or so of solution may be taken in the mouth and used to bathe the tonsils by swaying the head from side to side.

Hæmorrhoids injected with Quinine Urea Hydrochloride 5 to 10% solution. Enemata of Sodium Bicarbonate used for washing out the bowel instead of soap in U.S.A.—non-irritating.—L. J. Hirschman, B.M.J. ii./21,155.

The injection is to be got between the vein and the mucous membrane of the rectum, and not in the vein itself. It is seldom necessary to give more than 3 Cc. at one sitting. Injections given at weekly intervals, 6 to 8 being the average number required.—C. Howard, L. i./29,20.

Sloughing after 5% Quinine Urea for injection in hæmorrhoids. Never inject an external pile or a prolapsed internal pile without first reducing it and never inject a pile that is already sclerosed.—L. i./30,1027.

PRURITUS ANI, VULVÆ, AND SCROTI, well treated as follows: render part clean, apply Mercurochrome solution as antiseptic, inject small area with not more than 10 Cc. 1% Procain, inject ¼ grain Morphine hypodermically, infiltrate remainder of diseased skin with Quinine and Urea Hydrochloride solution 0·25 to 0·5% (as much as 200—300 Cc. may be used). Itching arrested, excoriations healed and skin becomes normal in few days.—Jl. A.M.A., Sept. 6, '24,766.

EXOPHTHALMIC GOITRE and thyroid enlargement treated by injections of 4—8 Cc. of a 4% solution of Quinine Urea Hydrochloride into the thyroid. After a few treatments the goitre becomes smaller and when it is one-third of original size the treatment can be stopped, as the shrinking will continue until no tumour is perceptible. The drug is believed to act through its necrotic action on the parenchyma of the gland.—H. G. Loughran, Med. Jl. Austral., '27,263, per Pres., May, '27,173.

From point of view of acidity no advantage in this salt over hydrochloride.—J. H. Crawford, B.M.J. i./22,874.

Sterules contain 3 and 5 Cc. of 1% solution for subcutaneous use.

Sterules of Urea-Quinine with Eucaine ¼ grain each for dental use are prepared.

Suppositories contain 5 grains for use in painful hæmorrhoids.

Ointment 20% in Lanolin and Soft Paraffin.

Quininæ Hydriodidum. *Syn.* QUININE IODIDE. $C_{20}H_{24}N_2O_2,HI$ =452·143. Is in minute pale-primrose coloured, slightly soluble crystals. **Quininæ Hydriodidum Acidum.** *Syn.* QUININÆ IODIDUM ACIDUM. $C_{20}H_{24}N_2O_2 2HI,5H_2O$=670·1608. Is in golden crystals, soluble about 1 in 20 of water. Contains 48·4% Quinine. Must be kept from the light. **Quininæ Hypophosphis.** $C_{20}H_{24}N_2O_2$, $H_3PO_2.2H_2O$=426·2818. In crystals or powder. Soluble 1 in 35 in water, or even less if pure.—D. B. Dott, P.J. i./22,64,87. More soluble in alcohol 90%. Contains 76·05% Quinine.

Quininæ Lactas, Quinine Lactate.

$C_{20}H_{24}N_2O_2.CH_3.CHOH.COOH = 414{\cdot}25$.

A granular white powder, soluble 1 in 10 of water; said to be well tolerated. Contains 78·3% of quinine. Suitable for hypodermic injection. For gonorrhœa, 1% solution forms an excellent injection.

Dose of each of the above.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more.

Quinine-Mannitol Injection.

Suggested Dose.—15 to 30 minims (**1 to 2 Cc.**) hypodermically, containing 2 to 4 grains of Quinine Base.

A suggested intravenous dose is 1 Cc., diluted to 10 or 20 Cc. just prior to use, but *clinical information* obtainable on it is meagre.

Preparation.

The solution has the following composition: Quinine Base 12 Gm., Boric Acid 8·4 Gm., Mannitol 7·5 Gm., Distilled Water to 100 Cc.

Uses.—This new solution of Basic Quinine for injection was designed to replace acid solutions.

Alkaloidal salt solutions on entering the tissues are decomposed by the alkalinity of the blood; *free base is liberated before absorption.* Hence it is better (see **Activated Alkaloids**), to use when possible, an alkaloidal base in solution. The necrosis caused by Quinine salts locally is no doubt due to the deposition of the base at the site. Such Quinine can have no immediate efficacy.

When Quinine-Mannitol comes in contact with blood a large proportion of the Quinine (larger than in the case of Quinine Acid Hydrochloride) is present in solution in the basic condition, and, therefore, in all probability, is more readily absorbed and is less likely to be deposited.

Quinine Base is more active against free-living protozoa than the hydrochlorides. Further, J. A. Sinton found better results in malaria by the use of alkalies with the Quinine. H. W. Acton has also recorded the increased activity of the salts towards paramœcium in presence of alkali.

For further details, see a paper by W. H. Martindale, L. i./26,455.

Toxicity.—

Some experiments, kindly conducted by Major H. C. Brown, showed the toxicity to mice intravenously to be practically the same as that of a Quinine Acid Hydrochloride solution of equivalent strength. The lethal dose of the solution, suitably diluted 12 or 24 times, was found to be about 1 Cc. per kilo body-weight (approx. 120 mg. of Quinine per kilo).

A small point, which needs obvious mention, is the possibility of the cumulative effect from the 1½ grains of Boric Acid, if repeated; but this is, perhaps, negligible. The addition of Mannitol to injections is occasionally referred to and recommended in the literature.

The above comparative results with Quinine Acid Hydrochloride are of value in respect of a toxicity dose of Boric Acid. We have not seen the toxic dose of Boric Acid by injection in any work of reference.

Quinine-Mannitol Sterules.—2 Cc. containing **0·24 Gm.** (**4** grains) of Quinine according to the above formula are prepared.

A woman of 19, married and 6 months' pregnant had fever and high temperature for over 2 months. An examination of the blood for malaria parasites proved positive. Mannitol-Quinine was given intramuscularly the following

day. From the first injection the fever abated, appetite increased, the jaundiced colour disappeared and her general condition improved.—Julio A. Santos, Porto Rico, 1928.

A further intimation from the same source conveyed that the preparation did not cause pain and irritation as other types of Quinine.

PNEUMONIA.—Intramuscular injection of a 3% oily solution of Quinine with Camphor and Terpenes of value. The basic Quinine alkaloid thus administered is conducted to the lungs, where it exerts anti-bacterial effect.—L. M. Flewelling, B.M.J.E. i./29,98.

Quininæ Nucleinas. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellowish powder containing 60% quinine and 40% nucleinic acid. Insoluble in water. In syphilis has been employed as 5% suspension in Olive Oil. Intramuscular injections of 10 Cc. were used, assisted by intravenous injections of the hydrochloride.

See also Quinine Hydrochloride, and compare Quinine Urethane.

Quininæ Periodidum. $C_{20}H_{24}N_2O_2.3I=704·9992$.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) (in Slipule No. 5)

When made by interaction of Quinine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a dark-red powder containing 46% of Quinine, according to investigations in the author's laboratory (1923).

This Periodide is almost completely resistant to Physiological Acid, only 1·6% of the Periodide being liberated, while on the other hand a large proportion (9·3% of the Periodide) is liberated in Physiological Alkali.

Soluble slightly in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Uses.—In all forms of fever, especially malaria. In influenza, the combined effect of Quinine and Iodine may be of value. In general it is a tonic. Many persons do not tolerate the irritant effects of Quinine Sulphate or the Hydrochloride. It contains a large proportion of Quinine, which passes through the stomach without discomfort.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after meals.

Quininæ Phosphas.

$2[C_{20}H_{24}N_2O_2]$, $H_3PO_4+8H_2O=890·5746$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**). Is in acicular crystals like the sulphate, but harder and denser. Contains 72·8% quinine Composition varies with manufacturers. Soluble 1 in 420 of water.

Quininæ Salicylas. F.E. VIII., P. ITAL. V.

$C_{20}H_{24}N_2O_2.C_6H_4(OH)COOH+H_2O=480·2656$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

White crystals, sparingly soluble in water, and about 1 in 60 of alcohol 90%.

Incompatible with mineral acids—salicylic acid may crystallise out. Contains 68·8% of quinine. Should be given suspended in water, or in cachets, or pills with syrup of glucose ; recommended for diarrhœa and neuralgia, rheumatism and sciatica.

In rheumatic fever virtually inert.—R. Stockman.

Tablets 3 grains (**0·2 Gm.**). *Dose.*—1 to 2.

Capsules contain 5 grains (**0·3 Gm.**).

In dengue Quinine Salicylate 5 grains every four hours has proved useful.—Brooke.

Quininæ Acetyl-Salicylas.

$C_{20}H_{24}N_2O_2.CH_3.COOC_6H_4COOH = 504{\cdot}2656$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Useful antipyretic and antiseptic compound. Contains 64·3% Quinine. Melting at 167° C. ***Soluble*** in Water 33, Alcohol 1 in 40, Chloroform 1 in 10. Immediately decomposed by Acids and Alkalis. Tablets, 3 grains are prepared.

✱**Quinisan** (T.M. 502838). *Syn.* QUINISAL, QUININE BISALICYLO-SALICYLATE.

Dose.—1 or 2 tablets two-hourly, 4 to 6 times daily.

For use in influenza, coryza, tonsillitis, neuralgia, etc.—L. ii./30, 1382.

Quininæ Sulphas. **Quinine Sulphate** (Termed '**Basic**' **Quinine Sulphate** in FR. CX., P. ITAL. V. and **F.E. VIII.**).

$(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 7H_2O = 872{\cdot}5912$. FR. CX., P. Jap., Ph. Ned. V. and P.G. VI., $8H_2O$. *B.P.*'14 $7\frac{1}{2}H_2O$. U.S. X. '7 or 8' H_2O. F.E. and P. Ital. have $8H_2O$., P. Belg. $7H_2O$.

This is the principal quinine salt, it contains 73·5% (*B.P.* '14).

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**), tonic; 5 to 15 grains (**0·3 to 1 Gm.**), antiperiodic. Slipule No. 0 holds 5 grains.

F.E. gives max. dose *pro die* 2 Gm.

White bitter crystals. ***Soluble*** 1 in 800 of cold water, 1 in about 100 of 90% alcohol, 1 in 40 of glycerin. It is rendered more soluble by the addition of Antipyrin.

Over Dose.—100 grains of Quinine Sulphate taken in one dose in error Hot infusion of coffee gave great relief and holding hands in *hot* water. Temporary deafness was caused.—E. T. Jones, L. i./14,277. *See also* Ill Effects. *postea.*

Fatal poisoning in child of 2½ following ingestion of 26 five-grain tablets (sugar-coated) Quinine Sulphate.—S. G. Willimott, L. ii./31,1133.

QUININE SULPHATE STORAGE.—Loss of water and consequent increase of alkaloidal content.—C. E. Sage, P.J. ii./27,264.

General alkaloidal test suggested by Pharm. Committee for B.P. would result in chaos.—B. F. Howard, P.J. ii./31,49.

Water content varies among the National Pharmacopœias, *v. supra.* The Dihydrate containing 4·5 to 4·7% water should be International.—R. Eder, P.J. ii./30,242.

It is prescribed in pill, cachet, slipule, tablet or mixture—if in mixture 1 minim of Dilute Sulphuric Acid to the grain of salt will render more soluble (with fluorescence). For pills 1 drop of strong Sulphuric Acid as excipient for 5 grains.

Incompatible with alkalis and alkaline carbonates, also incompatible with Liquor Ammonii Acetatis (unless distinctly acid in reaction), iodides, and astringent infusions containing tannin. The addition of a small proportion of sodium hypophosphite may overcome the incompatibility with potassium iodide—*i.e.*, the formation of herapathite (quinine iodosulphate).—To prevent coagulation of the precipitate when prescribed with alkalis, mucilage of acacia should be ordered. With Phenol in a pill may liquefy.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold doses);

Syrupus Aurantii. Liquid Extract of Yerba Santa in ½ drachm dose, diluted takes away the taste to some extent.

Prescribing Note.—To overcome the taste to some extent **Mistura Quininæ Effervescens**, p. 732 is advised.

Uses.—For all forms of fevers, and as prophylactic; wards off remittent fever. For neuralgia and nervous headache; it combats whooping cough, influenza (Ammoniated Tincture) and hay fever. It increases uterine action, and is the most used tonic drug; antiseptic in typhoid, phthisis and pneumonia. Pills of Quinine, Atropine, and Arsenic (*q.v.*) will frequently stop the development of a "cold." If Quinine deafness occurs, or for large doses, hydrobromic acid should be used. In labyrinthine disorders, it is very uncertain—often intensifying the symptoms. May be administered by Iontophoresis.

Quinine affects metabolism. The total solids excreted by the urine may drop 40% within 24 hours after a single dose.

Slipules contain 1, 2, 3, and 5 grains.

Klein discovered that quinine is excreted (and therefore presumably absorbed) more slowly when given hypodermically than when given *per os*. In malaria it is a good plan to give both *per os* and hypodermically simultaneously, so that if rejected by the stomach there will be no loss of time. Children bear quinine well. A child of ten will tolerate an adult dose, a child of five will take 5 grains twice daily, and a child of one year will take 3 grains twice daily without risk. Quinine should be kept up in full doses for about a fortnight after the fever has ceased, and then continued in doses of 10 grains twice daily on two consecutive days in each week. If the drug is stopped, even after two or three weeks of thorough treatment, relapses are the rule, and it is generally only after the occurrence of the relapse that the average hospital patient begins to take seriously the advice to continue the use of the quinine.

For Malaria treatment with Quinine, see p. 737.

Quinine in Various Affections.

ANÆMIC DROPSY.—Quinine is a reliable diuretic, but does not produce results in healthy or non-œdematous persons.—Per Chininum, 206.

BEDSORES treated by an ointment of Quinine alkaloid 4 grains, Oleic acid 12 grains, dissolved on a water bath and mixed with Resin Ointment 1 ounce, said to be useful.—Pres., Nov., 1911, p. 281.

BLACKWATER FEVER.—No evidence that Quinine administered by any method during an attack increases severity or influences progress of the disease apart from its effects on malaria.—L. S. Dudgeon, Pr., April, 1921, p. 283.

QUININE HÆMOGLOBINURIA occurs in people suffering from chronic malarial cachexia, induced by several attacks of malaria, for which Quinine in small, irregular and insufficient doses has been taken. Disease precipitated by taking comparatively large doses of Quinine during an attack of fever. Recovery after stopping all Quinine until hæmoglobinuria disappears, and then giving the drug (bihydrochloride) in small and increasing doses preceded by Calcium Lactate.—N. Cantlie, Jl. Trop. Med., Feb. 1, '23,40.

COMMON COLD.—The late R. W. Allen considered Quinine a useless drug theoretically. It is only antiseptic in strength of at least 1 in 500 solution, and a few grains daily internally are not likely to reach the nasal mucus to disinfect it.

DYSPEPTICS should not have Quinine. Tablets should be taken with food, and never given to patients on a hydric diet. Case recorded in which 17 tablets of Sulphate of Quinine were emitted in two stools in 48 hours.—R. Le Dentu, per Jl. Trop. Med., Nov. 1, '23,336.

DIPHTHERITIC OPHTHALMIA and all cases of infective and sloughing ulcers of the cornea are treated with 1% solution with the smallest possible quantity of dilute sulphuric acid.

EXOPHTHALMIC GOITRE.—Give 0·8 Gm. Quinine Sulphate in two portions and increase slowly daily for 8 days, then 8 days' rest and so on until appearance of definite results, when reduce to 3 days a week till cured.—Per Chininum, 204.
See also under Quinine Hydrobromide.

INFLUENZA.—2 grains every 2 hours gave striking results—also valuable as a prophylactic, 2 grains every 4 hours.—H. B. Gladstone, B.M.J. i./29,534.

TO INDUCE SLEEP.—Quinine—1 to 2 grains at bedtime stated to have excellent effect (from the '*Hospital*').—P.J. ii./13,526.

Labour. 'Medicinal Induction' (*Castor Oil and Quinine*).—2 ozs. of castor oil is given and an hour afterwards ½ an ounce of a mixture containing quinine sulphate 10 grains, dilute sulphuric acid 10 minims, glycerin 20 minims spirits of chloroform 5 minims, and water to ½ ounce. One hour after a simple enema is given. Two hours later another dose of the mixture, also three hours later and again after four hours. Forty grains of quinine are used. Greater percentage of successes than with Pituitrin. Less danger with Pituitrin when preceded by Quinine course. Quinine is definitely able to act upon a closed cervix.—K. V. Bailey, B.M.J. i./26,18; L. i./26,282.

EFFECT OF QUININE ON THE UTERUS.—It does not excite the normal pregnant uterus and therefore will not act as abortifacient in health, but it will excite the uterus in pathological conditions and strengthen uterine contractions in labour.—B.M.J. i./23,156.

Stimulant action of Quinine in labour is very small.—A. W. Bourne and J. H. Burn, B.M.J. ii./30,87.

Quinine in normal labour. A small dose for 3 weeks prior to the date. Quinine Sulphate 1½ grains, Dilute Nitro-hydrochloric Acid 3 minims, Syrup Aurant. ½ drachm, Water to 2 drachms. *Dose.*—2 drachms with water thrice daily before meals. Two 8 oz. bottles will carry the patient over the 3 weeks. —D. A. Mitchell, B.M.J. i./30,144.

10 grains Quinine Hydrochloride effectual in late delivery.—B.M.J. i./30,628.

Babies born dead under Quinine induction.—D. D. Ritchie, B.M.J. i./30,414.

The Medical Faculty of Vienna report that Quinine is not an abortifacient.—A. Haberda, Jl. A.M.A. ii./29,163. ***See also Quinine in Malaria.***

PNEUMONIA.—Quinine given in the earliest possible moment very closely approaches a specific. Continuous treatment with small doses every two or three hours. Quinine is inimical to the progress of most acute infections. In the case of pneumonia it acts remarkably in limiting the spread of consolidation and in altering for the better the entire aspect of the disease. Calomel must be given at the outset to cleanse the whole alimentary tract. Sodium Sulphate may be combined with the Quinine.—W. J. J. Arnold, B.M.J. ii./13,102.

PUERPERAL SEPTICÆMIA well treated by internal use of 2 grains every four hours: also used with advantage in perityphlitic abscess, gall bladder abscess and empyema immediately after operation and prior to and after operations in bone and joint disease.—V. J. Glover, L. i./17,352.

Collunarium Quininæ, Quinine Nasal Douche.

Quinine Sulphate 1, Water 1000.

Used in hay-fever. If a stronger solution be required, use the Acid Sulphate or Hydrochloride of Quinine; avoid excess of acid.

Mistura Chlori cum Quinina (Burney Yeo).

To Potassium Chlorate, in powder, 30 grains, in a 12-ounce bottle, add Hydrochloric Acid 60 minims; cork and shake well to liberate chlorine; absorb this by gradually adding, and shaking after each addition, Distilled Water *q.s.* to 11 ounces; add Quinine Sulphate 24 grains (or 36 grains if ordered), Syrup of Orange 1 ounce. *Dose.*—1 ounce (30 Cc.) every 2, 3, or 4 hours for typhoid; it quickly cleanses the tongue.

Pills and Tablets of 1, 2, 3, 4, and 5 grains are prepared.
Perles of Quinine Sulphate contain 1½ grains (0·1 Gm.) in each.

℞ ℙ 1 **Pilula Quininæ Hydrargyri et Opii.**

Quinine Sulphate 1½ grains, Grey Powder 1 grain, Opium ⅙ grain Quassia Extract *q.s.* thrice daily after food.

In syphilis Quinine is useful before or after a course of Mercury.

Acts beneficially in any septicæmic state with fever, whether due t gonorrhœa, syphilis, or enteric. Quinine, Opium and Mercury are shee anchors in early syphilis.

℗ **Pilula Quininæ Ipecacuanhæ et Camphoræ.**

Dose.—One night and morning.

Quinine 2 grains, Ipecacuanha ¼ grain, Camphor ¼ grain, Liquid Carbolic Acid ¼ minim, have been advocated as preventive of plague. Nim fumigation (burning Azadirachta) also suggested.

ℙ 1 **Pulvis Quininæ Compositus.** *Dose.*—One powder.

Quinine Sulphate 5 grains, Phenacetin 5 grains, Arsenious Acid 1/50 grain, Nux Vomica Extract ¼ grain, Milk Sugar (*q.s.*) to 12 grains. One powder (or cachet) every four hours till the fever breaks. This is used as a fever remedy in Demerara and is excellent.—Ph. Notes.

℞ ℙ 1 **Pulvis Quininæ, Arsenii, Hydrargyri et Ipecacuanhæ Compositus.**—*Dose* in Cachets.—One at eleven, another at bedtime.

Quinine Hydrochloride 5 to 7 grains, Arsenious Acid 1/36 to 1/24 grain, Compound Ipecacuanha Powder 3 to 4 grains, Calomel 1/10 to 1/6 grain.

In chronic malaria with enlarged spleen. Each ingredient serves a useful purpose—the Mercury for its antiseptic effect, the Arsenic enhances the activity of the Quinine, the Opium, not only from its traditional use in malaria, but also from the writer's experience is of value as an addition to the prescription.—Cantlie.

℞ ℙ 1 **'Old English' Fever powder.** Quinine Bihydrochloride 3 grains, Arsenious Acid 1/36 grain, Compound Soap Pill 1 grain, Calomel 1/12 grain. Three times daily in a cachet. Malaria well treated. The following daily dose made up in the form of a pill recommended as prophylactic :—Quinine Bihydrochloride 1½ grain, Arsenious Acid 1/100 grain, Compound Soap Pill 1/10 grain, Calomel 1/25 grain.—Jl. Trop. Med., Aug. 15/22,265.

Quinine has taken the place of Opium in the treatment of malaria with poor results—efficacy of the old "English Fever Pill." Evils of State interference. —Sir J. Cantlie, Jl. Trop. Med., Jan. 15, '23,30.

Mistura Quininæ Effervescens.

Quinine has a reputation in colds, but it is best given in effervescence. The following prescription is useful :—

Mixture A.—Quinine Sulphate 2½ grains, Citric Acid 10 grains, water to ½ ounce.

Mixture B.—Potassium Bicarbonate 10 grains, Ammonium Carbonate 2½ grains, Syrup of Orange 1 drachm, water to 1 ounce.

One tablespoonful of Mixture (A) with two of Mixture (B) in effervescence thrice daily.—Leonard Williams, per C. & D., June, 1921.

Roseberry's Chlorine Water Mixture (Modified). An infant suffered from vomiting and diarrhœa and was unable to take milk or foods such as Glaxo. The usual antiseptic and astringent infantile powders failed to cure. The modified Roseberry's Mixture containing Quinine Sulphate with Salol 4 grains, Mucilage of Tragacanth *q.s.*, and Chlorine Water to 1 ounce, thrice daily, gave no lasting relief. Rectal Saline was also tried. Finally, as last resource, when the child was not expected to live, weak tea infusion saved its life.—Capt. G. H. Wood, per Jl. Trop. Med., April, 15, '22,109.

Tinctura Quininæ Ammoniata (*B.P.* '14).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Quinine Sulphate 2, Alcohol (60%) 90; mix and add Solution of Ammonia 10. The Quinine precipitates on adding to water; a few grains of Tragacanth will suspend the precipitate; with syrup of orange it is palatable, and bears dilution better; it remains bright if mixed with aerated water. Should be kept in the dark, or it will become discoloured.

Ammoniated Quinine Slipules and **Tablets** are prepared, each equivalent to 1 drachm of the preceding Tincture.

Ammoniated Quinine Tablets. Analysts' findings on trade varieties. Ammonia likely to be lost.—P.J. i./31,499.

Mistura Quininæ Composita, L. H. *Syn.* **Broadbent's Mixture.**

Dose.—½ ounce (**15 Cc.**).

Ammoniated Tincture of Quinine 1 drachm, Solution of Ammonium Acetate 2 drachms, Compound Tincture of Camphor ½ drachm, Ammonium Carbonate 2 grains, Peppermint Water to ½ ounce.

Mistura Quininæ Ammoniata, St. M.'s H.

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Ammoniated Tincture of Quinine 1 drachm, Solution of Ammonium Acetate 2 drachms, Sodium Nitrite 1 grain, Tragacanth Mucilage 1 drachm, Chloroform water to 1 ounce.

Tablets Ammoniated Quinine Compound, each equivalent to Ammoniated Tincture of Quinine ½ drachm, Capsicum $\frac{1}{10}$ grain, Camphor $\frac{1}{10}$ grain, Caffeine Citrate ¼ grain, Aloin $\frac{1}{20}$ grain. Serviceable in influenza.

Tablets Quinine Acid Sulphate 1 grain with Camphor ¼ grain, also this combination Ⓟ **with Aconite Tincture** 1 minim.

℞℗**Tablets, Quinine, Camphor, Morphine, and Atropine.**

Camphor ½ grain, Quinine Sulphate ½ grain, Morphine Sulphate $\frac{1}{4}$ grain, Atropine Sulphate $\frac{1}{2000}$ grain.

For common colds, especially where excessive running at eyes and nose.

Quininæ Sulphas Acidus, Quininæ Bisulphas, U.S., Ph. Ned. IV., Ph. Jap. III. (now omitted), **P. Hung.** Termed '**Neutral**' in Fr. Cx., P. Ital. V. and F.E. VIII. $C_{20}H_{24}N_2O_2.H_2SO_4+7H_2O=548{\cdot}388$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

F.E. gives max. dose *pro die* 2 Gm.

Tablets, ½, 1, 2, 3, 4 and 5 grains.

Usually masses of crystals; 59·1% of Quinine. Soluble 1 in 10 of water, and is therefore a suitable salt for preparing eye lotions. Three grains to an ounce of water has a specific action on ophthalmic diphtheria. Incompatible with Potassium Iodide.

Dispensing Note.—*The heating of concentrated solutions is undesirable. The Acid Hydrochloride is best for injections. Cf., p.* 718.

Malaria Treatment.—Quinine Bisulphate 4 grains in 20 minims of 0·5% Saline solution subcutaneously once daily for five consecutive days in alternate flanks. In addition Arsenious Acid 1/20th grain *per os* and also 5 grains (only) of Quinine well diluted in the early morning—continue for a month.—C. A. Johnston, B.M.J. i./18,586. *We should prefer the Hydrochloride or Acid Hydrochloride.*

For Malaria treatment, see also p. 737

CYSTITIS treated by Quinine Bisulphate 1 in 2,000 as an irrigating solution. Irritation is not noticeable. It will inhibit growth of *B. Typhosus* in the strength of 1 in 30,000.—E. McDonald, Jl. Am. M. A. i./15,505, per P.J. i./15,287.

Tablets of Quinine Rhubarb Compound, contain Quinine Acid Sulphate 1 grain, Jalap $1\frac{1}{2}$ grains, Calomel 1 grain and Rhubarb $1\frac{1}{2}$ grains; are given to check malarial poisoning.

In purulent ophthalmia, hypopyon and keratitis, *Guttæ* containing 3 grains with 12 grains of Boric Acid per ounce are useful.

P1 **Esanofele.**—A proprietary preparation in pill form containing in each Quinine Bisulphate 0·09 Gm., Arsenious Acid 0·0009 Gm., Iron Citrate 0·02 Gm., Extract of Bitter Herbs 0·145 Gm.

Used in malaria.

Dose.—For a child 3 to 6 years: two pills daily preferably in the morning, *e.g.*, one at 6 and another at 9. For 7 to 14 years two at 6 and two at 9. For adult six daily, *e.g.*, two at 5, 8 and 11 a.m. respectively. Fifteen days constitute a course.

Quininæ Tannas, Quinine Tannate, P. Jap. (30% Quinine). **P. Helv.** (30—35%), **P.G. VI., Ph. Ned. V., P. Ital. V.** and **P. Dan.** (30—32%).

P. Austr. and **P. Hung.** give method of making from the sulphate.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). An amorphous yellowish white powder, obtained by the decomposition of the sulphate with a solution of tannin, contains about 30% of Quinine (U.S. between 30 and 35%) and is slightly soluble in water and about 1 in 3 alcohol 90%. Being almost tasteless it is recommended for children, to be given in milk, but the slow dissociation in the intestines may be a disadvantage.

With 1 molecular proportion of Neutral Quinine Sulphate to a little more than 3 of Tannic Acid the precipitation is complete.

Tabellæ Quininæ Tannatis.

Contain 1 grain in a chocolate basis. Suitable for children. As a prophylactic to malaria. Have also been given for whooping cough and as a stimulant in entero-colitis in children, and with ergotin for sweating.

Ⓟ **Quinine and Urethane (Hydrochloride).**

Dose.—$\frac{1}{2}$ to 3 grains (**0·03 to 0·2 Gm.**).

Employed hypodermically, as it is non-irritating.

Obtained by heating Quinine Hydrochloride 3 with Urethane 15 and Water 3 parts.

For details of Urethane, see p. 818.

MALARIAL COMA.—The only treatment found of value was Quinine Hydrochloride 0·4 Gm. with Urethane 0·2 Gm. in 15 Cc. Normal Saline intravenously; also valuable for persistent fever and chronic forms of malaria. Painless. Intramuscularly not advised.—Richet and W. B. Griffin, B.M.J. i./17,190.

MALARIAL ANÆMIA.—The following was useful in Salonika during the war: Quinine Bihydrochloride 0·8 Gm., Urethane 0·4 Gm., Distilled Water 2 Cc. Intramuscularly in gluteal region. In *infants* intramuscular injection of 0·05 Gm. Quinine Formate daily, and later every other day, for 8 to 10 injections.—Leon Tixier, per Chininum, 127,129.

LOBAR PNEUMONIA.—Intramuscular injections of 5 Cc. of a solution of Quinine Hydrochloride 0·5, Urethane 0·25, and Water 5·0, of value; repeat in 24 hours and again in 48 hours if necessary.—Per Chininum, 178.

Varicose Vein Injection.

The Quinine-Urethane method was originally popularised by Genevrier in France. The injection contains Quinine Hydrochloride 4 Gm., Urethane 2 Gm. in Distilled Water 30 Cc. The solution can be boiled and is strongly antiseptic. Crystallises out when cool but redissolves on immersing in hot water for a few seconds.

Initial injection ½ Cc., and subsequently 2 to 3 Cc. Injections may be given with the patient sitting or lying down (*v.* R. Payne, *postea*)—in the latter case, a pneumatic tourniquet is applied to the middle of the thigh before the patient lies down. Clean the skin with Ether and introduce needle of syringe not quite filled with solution into the lowest segment of the vein, the skin overlying the vein being drawn aside before introducing the needle. Withdraw the piston slightly and allow blood to flow into the barrel before any fluid is introduced. Inject ¼ to ½ Cc. according to size of vein and hold needle in position for 30 seconds before withdrawal. Press a pledget of wool on puncture and repeat the process 4 inches up the limb. When the total number of injections has been given clean with Ether and seal punctures with Collodion dressings. Sittings are given at weekly intervals, 6 sittings usually sufficing. Injections may be successfully given, without fear, in the region of the saphenous opening.

After-effects.

Patients should be told that *small and thin-walled veins will swell up* rapidly to four times their original size. The swelling passes off in a few hours and is of no importance. *Sensations of fullness, aching, or tenderness* sometimes occur lasting three or four days; *a feeling of contraction* of the leg following one month after obliteration of the internal saphenous vein passes in a few weeks. *Œdema of foot and leg* occurs in about 2% of cases from 5 to 7 days after injection, persisting for some two weeks. *Itching of the overlying skin* (following treatment by any sclerosing solution) is relieved by application of Ichthyol and Lassar's Paste.—A. H. Douthwaite, 'The Injection Treatment of Varicose Veins' (H. K. Lewis), 5th Edition, 1929.

Over 6,000 injections, given without the production of embolic mishap, are sufficient testimony to the safety of one of the greatest additions to modern therapeutics.—A. H. Douthwaite, *ibid.*

This procedure has been chiefly used at Bart's. Injections of 2 Cc. can generally be relied on to thrombose 5–6 inches of a vein. Injections are needed at approximately 4–5 inches along the course of a vein. In this way the whole saphenous tract may be treated to within about 4 inches of the saphenous opening.

Contraindications: Deep thrombosis, acute phlebitis, intra-abdominal tumours, cardio-vascular disease, skin diseases, pregnancy. The injection should not be given during menstruation.—R. T. Payne, L. ii./29,313.

Quinine-Urethane is painless at the time, but followed in 2 or 3 days by thickening along the vein.—Alan Perry, L. ii./29,901.

Quinine-Urethane given hot!—about 200° F., by warming in hot water. Enhances the action.—F. Reynolds, B.M.J. ii./30,268.

May cause cramp 5 or 6 hours after. Clot remains red and painful for 6 weeks. With thin-walled veins action severe.—D. Levi, L ii./30,16.

Quinine-Urethane ***the most satisfactory*** for veins. Patien ***never allowed to stand during injection,*** a tourniquet being used and released when needle is in lumen of the vein and before the injection.—Reginald Payne (St. Bart's.), B.M.J. i./32,237.

VARICOCELE successfully treated by Quinine-Urethane injection (Douthwaite's formula)—one injection of 1 Cc.—H. M. Hanschell, B.M.J. ii./28,915.

ANGIOMA OF THE LOWER LIP treated by 14 injections over 6 months, commencing with 0·5 and increasing to 1 Cc. Injections through sound skin near margin of tumour. Treatment painless.—Graham, Jl. R.A.M.C., April 1930.

HYDROCELE OF THE TUNICA VAGINALIS treated by injection of Quinine-Urethane solution 2 Cc. without pain or discomfort.—F. C. Pybus, B.M.J. i./30,239.

HÆMORRHOIDS treated with Quinine Hydrochloride 0·8 Gm., Urethane 0·4 Gm. in Normal Saline 2 Cc.—Bellot, L. i./29,1072.

Good results by injection of 3 to 5 Cc. 5% solution ***perivenously*** (into the submucous tissue round the piles), repeating the injection at weekly intervals on opposite sides.—A. H. Douthwaite, 'The Injection Treatment of Varicose Veins' (H. K. Lewis), 5th Edn., 1929.

Perivenous Administration.

The needle is first introduced into the lumen of the vein and then withdrawn until its point is felt to slip out of its wall into the adjacent tissues, when 2 minims of solution are injected. There is immediate but transient pain and subsequent swelling, redness, tenderness and local œdema, usually passing off within a week. This method is rarely necessary, but of value in dealing with large isolated dilatations. It should never be made with solutions *other than those of Quinine.*—A. H. Douthwaite 'The Injection Treatment of Varicose Veins' (H. K. Lewis), 5th Edn., 1929.

Varicose ulcers well treated, with Zinc Gelatin in addition.—R. Gibson and A. R. Somerford, B.M.J. i./28,978.

Ⓟ **Quinine and Urethane Sterules,** 2 Cc. **for Varicose Veins,** are prepared.

Ⓟ **Solutio Quininæ et Urethani** (for varicose veins), St. Th. H.

Dose.—5 Cc. intravenously.

Quinine Hydrochloride 5% and Urethane $2\frac{1}{2}$% in Distilled Water.

See also Sodium Morrhuate, Sodium Salicylate, Sodium Chloride, Glucose and Therap. Index.

Quininæ Valerianas. 'BASIC' QUININE VALERIANATE, FR. CX., P. Ital. IV. $C_{20}H_{24}N_2O_2,C_4H_3.COOH=426·2814$.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

White crystals, or powder with slight valerianic odour, contains 76% of Quinine, soluble 1 in 80 to 90 of cold water.

Pills containing 1 grain each of the Valerianates of Quinine, Iron, and Zinc. For nervous headache and hysteria.

For treating paroxysmal sneezing, H. Tilley finds these useful.

Ⓟ **Capsulæ Valerianatum Compositæ.** Form I.

Dose.—One thrice daily. Valerianates of Quinine, Iron and Zinc 1 grain each, Nux Vomica Extract ¼ grain, with or without Cascara Extract 1 grain. Taste and odour covered with Saccharin and Mint. Total weight of Capsule 10 grains. Nervine tonic.

Ⓟ **Capsulæ Valerianæ Compositæ,** Form II. *Dose.*—One after meals thrice daily. Valerian Extract 2 grains, Phenol 2 grains, Strychnine Hydrochloride 1/40th grain, Codeine ¼ grain, Rhubarb Extract $1\frac{1}{2}$ grains. Total weight of Capsule 10 grains. Tonic, antiseptic and nerve sedative for use in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Quinine Ethylcarbonate. **P. Jap., P. Helv., U.S. X., Ph. Ned. V., F. E. VIII., P. Belg. IV., P. Ital. V.**

Syn. ✱EUQUININE (T.M. 317242), $C_2H_5O.CO.OC_{20}H_{23}N_2O$. PATENT 4991 (1896) and 22639 (1899)—now public property. German Patent 91370 (18/12/95) with addition of 123748 (30/1/00). U.S. Patent 585068 (1897). *Cf.* also Aristochin.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**) in cachet. F.E. gives max. dose *pro die* 4 Gm.

Manufacture.—By action of Ethyl Chlorocarbonate (B.pt. 94° C.) on Quinine. Notes on, see Edn. XIX, p. 741.

White needle crystals, M.pt. 89 to 91° C., with little taste, sparingly soluble in water, more so by addition of dilute acid; easily soluble in alcohol. Intended to replace quinine. **Tablets** contain 8 grains

Whooping Cough has been treated with it.

Other salts of Quinine in occasional demand are the **Hydrochloro-sulphate, Iodate** and **Sulphocarbolate.**

Aristoquinine. *Syn.* ✱ARISTOCHIN. (T.M. 322521). CHININUM CARBONICUM, P. Ital. V., Ph. Ned. V.

$CO(C_{20}H_{23}N_2O_2)_2 = C_{41}H_{46}N_4O_5 = 674{\cdot}3908$. The carbonic ester of quinine in white tasteless powder containing 96·1% of quinine. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**) according to age.

Obtained by heating Quinine with Phenyl Carbonate. *Further data on manufacture and Patents, see Edn. XVIII, p. 729 and XIX, p. 742.*

Insoluble in water. Given for malaria, typhoid, influenza, and in small doses for pertussis.

Incompatible with Acids and Alkalis.

Analysis.—The compound should be free from Chlorine. A commercial sample contained 6·9%.—L. ii./21,400.

Quinoidine.—*Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**) thrice daily.

The name given to a mixture of alkaloids (discovered by Seturner, 1830) in the mother liquor after the crystalline alkaloids have been separated. It occurs generally as a dark treacly compound or as a hard mass.

These substances being amorphous and hence, perhaps, more readily absorbed, it has been suggested are of greater value than the Sulphate and Hydrochloride of Quinine. *Benign tertian* cases required 9 to 13½ grains of Quinoidine to stop fever; *Malignant tertians* required an average quantity of 10 to 16 and *Quartan cases* an average of 22 to 24 grains.

[P] **Laverain Tablets.** *Dose.*—Up to 6 or 12 during the day.

Contain Quinoidine 2 grains, Ammonium Picrate ½ grain, and Arsenious Acid $\frac{1}{100}$ grain. The Picrate is employed as an anti-malarial drug in addition to the quinoidine. The Arsenic acts as tonic. The preparation is said to be prompt in reducing malarial fever, and specific for the malarial parasite—good in prophylaxis. A preliminary purge to be given (Calomel and Soda) washed down with Mistura Alba. Maj. Waters, Ind. Med. Gaz., 1916. See also D. G. Marshall, L. ii./18,417.

Quinine Salts in Malaria.

For the Etiology of Malaria and a Classification of the Parasites, see Vol. II.

According to the theory elaborated by Sir R. Ross and D. Thomson parasites continue to breed in the blood by the known method from the moment of infection until the last of them has died out. The number of parasites in high fever runs from 5,000 to 300,000 per cub. mm. of blood. Even if there were originally 1 parasite per cub. mm. it would mean 3,000,000 in the body. Unfavorable

climate, fatigue, etc., tend to precipitate relapses in malaria. Wh the infection continues there is a constant struggle with varyi fortune between the invaders and the opposing forces. Accordi to Lipkin, Quinine is concentrated in the suprarenals, kidneys a spleen ; cast out quickly from the lymphatic glands and the bloo and destroyed by the liver and muscles. Large numbers of t plasmodia are hence likely to escape any dose we can give. T *last* plasmodium must be destroyed. ***Anything under 6 grains a week appears useless in the large majorit of cases*** and anything over 15 grains daily seems only be required when there is fever, and say, for a week or for night afterwards, followed by 10 or 15 grains daily for months. *Te grains daily carried out rigorously for* 3 *months* (84 *days*) *is sufficie in the majority of cases.*—Sir Ronald Ross, B.M.J. ii./21,1 *et seq.*

Oral Use.

The following routine treatment of malaria has given good result the average length of treatment being 7 days :—

I. *Alkaline Mixture* (Sinton) (for adult) Sodium Bicarbonate 60 gr Sodium Citrate 40 gr., Water to 1 oz.

II. *Quinine Mixture* (Sinton) (for adult) Quinine Sulphate 10 gr., Citr Acid 30 gr., Magnesium Sulphate 60 gr., Water to 1 oz.

On the first day 4 doses of I and 2 of II, the latter 15 minut after the former : for next 4 days 3 doses of I followed after 1 minutes by 3 doses of II : and for next 2 days 2 doses of I followe by 2 doses of II, a total amount of 180 grains Quinine Sulphate i solution being taken.—K. V. Raju, I.M.G., May, '25,212.

Quinine said to act better in treatment of malaria when given in a ***alkaline medium.*** Arguments have been brought forward to sho that malaria is an acidosis—results of experiments.—Maj. J. A. Sinton, J Trop. Med., April 2, '23,116. *See also* 'Alkaloidal Notes' and Quinin Mannitol.

Optimum daily dose 30 grains—should cut short attack in week.—J. A. Sinton, B.M.J.E. i./31,78.

The **International Health Board, U.S.A.** made a vast malarial survey i one of the counties of the State of Mississippi. Over 30,000 people we examined and the conclusion was that Quinine will cure all cases of malari fever if it is given in the right doses for a sufficiently long period. Based o these results, the National Malarial Committee of the U.S. Public Healt Service adopted what is known as the standard treatment for malaria in th U.S.A. In the leaflet on the **Standard Treatment** it is stated that, to b most effective, Quinine should be taken one dose (10 grains for a person 15 years or older), *every night before retiring, for eight weeks without intermissio* If a person is ill with acute malaria he should take the dose according to h age about three times each day for not less than three days. This will sto the fever or chills and fever. He should then take one dose every night f eight weeks to get the malaria out of his system. Said to be 100% efficient.— See also C. C. Bass, N.Y. Med. Jl., June 20, 1923, per Jl. Trop. Med., Aug. 1 '23,270.

Given in 10*-grain doses* 2 *hours before the expected rigor, paroxysm, or accessio of pyrexia, followed by* 5 *or* 10 *grains in* 4 *hours, the attack can be overcome i* 3 *days.* The treatment must be continued 8 or 10 days in 9 or 15 grain dos daily. This suffices in the majority of cases, both as curative and prophylacti —Catholic Medical Guardian.

Quinine by the mouth is absorbed into the system in about half the time i which it is absorbed from an intramuscular injection.—A. E. Horn, Int. Con Trop. Am., '24,560.

Malaria control on a large scale is easily effected by use *per os*—not inferio to other modes.—J. W. Van der Spek, Chininum, 51.

Insoluble salts were found ***as good as soluble*** for oral use and administration in solid form compares favourably with a solution.—N. P. Macphail, Int. Conf. Trop. Am., '24,95.

Malaria in **Uganda.**—Routine treatment Quinine Hydrochloride, *per os*, sometimes intramuscularly in addition.—J. A. Taylor, B.M.J. i./20,113.

Quinine with Calomel.—Give Calomel first. Quinine always in solution with a little Sulphuric Acid. Wait until a high temperature has subsided before giving. Never give it on an empty stomach, and in many cases give a little alcohol after.—E. Yeates, B.M.J. ii./17,878; i./18,603.

Calomel and salts with large initial doses (30 to 45 grains daily) of Quinine. Malaria in Antigua.—W. M. McDonald, B.M.J. i./22,597.

Give small dose of Calomel (1 grain), repeated each night. Give the Quinine (Hydrochloride) in 3 or 4 grain doses, *before* meals and at bed-time, with 3 or 4 ounces of water. Continue for two months.—T. Stone Dixon, B.M.J. i./23,1087.

Quinine in combination with Arsenic, in the treatment of chronic forms of malaria, more efficient than Quinine alone. Methylene Blue used in combination with Quinine in cases of quartan fever which do not react to Quinine alone.—R. N. Chopra, per Jl. Trop. Med., Feb. 15, '23,69.

Subtertian Cerebral Malaria treated with Quinine and Galyl—the quinine *per os* (20 grains thrice daily) and intravenously (0·8 Gm.) over a period of time and the galyl (0·2 Gm. to 0·4 Gm.) subsequently intravenously.—A. W. Falconer and A. G. Anderson, L. ii./17,486.

Malaria in the Salonica Army. Quinine *per os*, *e.g.*, the sulphate, found preferable to intravenous use—the intravenous method produces the shortest stay of quinine in the system. Intramuscularly in oil gives the *longest* retention. Arrhenal 0·2 to 0·3 Gm. on two successive days, alternating with two days of treatment with 2 Gm. of Quinine.—L. ii./17,358.

It was found in a case of idiosyncrasy that **Cinchonine** base *q.v.* was better tolerated than Quinine Acid Hydrochloride.

A writer deplores 'fetish' of giant doses to reduce high temperature in malaria. Cinchona preferable to Quinine. In hyperpyrexia use of antipyretics such as Aspirin, Antipyrin, etc., until moderate temperature attained, when Quinine may be resumed.—Jl. Trop. Med., Aug. 15, '22,266.

Subtertian infection and benign tertian the most generally distributed—quartan the least. The first the most amenable to Quinine. Begin with 15 grains *per os*, increased daily to 30 grains. Neosalvarsan given as adjuvant. Arsenic and Iron injections more advisable than drenching with Quinine.—P. Manson Bahr, B.M.J. i./31,23; L. i./31,843.

Malaria control in Italy.—L. W. Hackett, Trans. Roy. Soc. Trop. Med., April 25, '29,477.

See also Quinidine, Cinchona Febrifuge, p. 713 *and Quinoidine, p.* 737.

Intravenous Injection (Quinine Acid Hydrochloride).

For details of doses and strengths of injections, see p. 724.

Malaria in Macedonia.—The first essential was found to be an initial dose of calomel, followed if necessary by a saline aperient. Moderate cases received Quinine Sulphate 45 grains (the supplies of Hydrochloride being short) divided into 3 equal doses, for at least 3 days and longer if pyrexia persisted. 30 grain doses then continued. In more severe cases 60 grains *p.d. per os* were given, or in part intramuscularly. In cases of persistent vomiting or marked digestive disturbance oral quinine is either rejected or remains largely unabsorbed, and the advantages of the intramuscular method are very great. It was found convenient in these cases to give two intramuscular injections, each of 20 grains, one in the morning, the other in the evening, supplemented by 20 grains of the bihydrochloride by mouth in the course of the day. As soon as the severer symptoms were under control oral administration of quinine was resumed. On the earliest appearance of cerebral symptoms ***10 grains of the Acid Hydrochloride*** intravenously in ***20 Cc. of diluent*** saved many lives—A. G. Phear, L. i./20,195.

There is no decisive experimental proof of the superiority of injections of Quinine.—Sir. R. Ross, B.M.J. i./20,130.

Malaria is not more readily cured by intravenous medication. 90% of t Quinine injected intravenously disappears from the blood within one min and is *stored in the tissues*, but intravenous medication will always have a m or less restricted field of usefulness.—B.M.J.E. ii./22,33.

Observations on 1314 cases of malaria by intravenous injection of Quini —Capt. N. Cantlie and El Sach Yusef Effendi Moubarak, Jl. Trop. M Feb. 15, '24,38.

Quinine intravenously ½ to 1 Gm., in 40—50 Cc. Saline, 2 to 10 times dai gave good results in 164 cases of malaria; no general or local reactions complications.—Med. Sci., July, '25,266, per Pres., Jan., '26,28.

Quinine Bihydrochloride efficacious intravenously in acute and chro malaria, and in cases in which malaria complicates other diseases: also us in pneumonia and septicæmia with success.—B. Rattan, B.M.J. ii./27,39.

Intravenously in chronic malaria. Violent and excruciatingly pain reactions, but of great efficacy.—Pierre Millous, per Chininum, 102.

Quinine intravenously is no better than by any other method and has ma disadvantages (thrombo-phlebitis, cinchonism): reserve for severe attacks. J. W. Van der Spek, Chininum, 50.

CEREBRAL MALARIA well treated by Quinine intravenously—0·5 Gm. the Bihydrochoride in 10 Cc. of water slowly injected—followed by cister puncture—W. Cordes, U.F.C., '25,199.

PERNICIOUS MALARIA well treated with intravenous injection of Quini Bihydrochloride 5 gr. in 20 Cc. Normal Saline with 10 m. Adrenalin Chlori solution.—K. N. Chatterji, I.M.G., Dec., '25,584.

Experiments in animals (sheep) indicated that Quinine Sulphate suspend in oil was weight for weight about 2·6 times less toxic than an aqueous soluti of Quinine Bihydrochloride, when both were injected intravenously.—J. Shircore and co-workers, Dar-es-Salaam, 1927.

Intramuscular Injection of Quinine Salts.

Hundreds of intramuscular injections of Quinine given over period of 19 years without a single distressing result. Injectio always given in the gluteal region, choosing the highest point whe the muscle is deep enough to sink the needle in—not the ordina short hypodermic needle, but one long enough to make sure of givi the injection well into the muscle. Injections should never be give into the arm.—R. A. Murphy, I.M.G., Jan., '25,48.

Intramuscular injection efficient and practical—danger of necrosis insigni cant. Only the more soluble salts of value.—N. P. Macphail, Int. Co Trop. Am., '24,95. In the discussion which followed, C. C. Bass consider Quinine hypodermically or intramuscularly had no place in treatment malaria and was a 'formidable procedure.' General trend of opinion, howeve in favour of Macphail's views, with the reservation that intramuscularly should be used only as a last resort in comatose or dangerous cases. Sir Rogers advocated use of Cinchonine in place of Quinine—more rapidly absorbe less pain and no induration.

Muscular necrosis an invariable occurrence with ***intramuscula administration*** of Quinine in malaria. Damage is intensified, in case alkaloid, by use of solvents such as Ether, Alcohol, Olive Oil or Creosote, a natural fat. Necrosis evident one hour after injection in man, and with ten minutes in animals.—Jl. Trop. Med., Jan. 1, '23,12.

Intramuscular use of Quinine Salts was *condemned* by the Medical Servi of the E.A.E.F.—A. R. Balmain, B.M.J. i./20,381.

Necrosis of muscle caused by Quinine injections into the buttocks—it w not possible to determine *form* of Quinine.—P. Figdor and D. D. Pinno B.M.J. ii./22,14.

Quinine Bihydrochloride exerts its influence on the tissues in two ways (*a*) ***presence of the acid radical causes irritation, œdem and pain,*** (*b*) the base, acting as a protoplasmic poison, causes death of t surrounding tissues. The salts of the four main alkaloids of the Cinchona ba all cause œdema, irritation and necrosis.—H. W. Acton and R. N. Chopr Ind. Jl. Med. Res., Oct., '24,251; B.M.J.E. i./25,60.

Intramuscular injection of alkaloidal salts of Quinine should be considered as malpraxis, as tissue is unable to live in presence of these bases at a high concentration, *viz.*, 1 : 2,000 and there is danger of tetanus with imperfect sterilisation. Oral method the only method of administering Cinchona alkaloids, though rarely in grave cases, *e.g.*, cerebral malaria, Quinine Base should be injected intravenously.—H. W. Acton and R. N. Chopra, Ind. Jour. Med. Research, Oct., '24; per Jl. Trop. Med., Jan. 15, '25,32. *See also* J. Macqueen, L. i./27,1289.

Quinine intramuscularly reaches the blood only a little at a time, whereas intravenously it reaches the parasites in maximum strength.—Nicotra, Policlinico, Feb. 16, 1919.

Subcutaneous Injection of Quinine finds few advocates. A *single drop getting into the skin produces necrosis.* Weak solutions, mixed with Urethane, recommended.—J. W. Van der Spek, Chininum, 50.

Tetanus from Quinine injections. — Remember that in sterilising a syringe cold Alcohol does not kill spores, neither does boiling water, nor boiling oil. To kill spores the syringe must be boiled in 5% Phenol for 10 minutes, or be autoclaved.—S. H. Daukes, M.P.C., Dec., '29.

Absorption and Excretion of Quinine.—See also expts. by M. Nierenstein, B.M.J. i./18,428; L. i./11,1221.

Estimation of Quinine in blood. — An accurate method elaborated by E. B. Vedder and Z. M. Masen is described in the Am. Jl. Trop. Med., Vol. XI, No. 3, p. 217. According to Acton and Chopra, a concentration of 1/150,000 is necessary for direct parasiticidal action, which corresponds to 6·7 mgr. per litre—a concentration of 10 mgr. per litre is regarded as the toxic limit for man.—Jl. Trop. Med., Oct. 15, '31,350.

Malarial Relapses.

The best for old cases was a system carried out by M. Harrison in an Investigation of Treatment under direction of Sir Ronald Ross. It was used on 49 chronic cases, mostly of benign tertian. Only 10·2% relapsed. Fever was reduced in 12 to 24 hours, and no asexual parasites could be found after 48 hours.

Patient to remain in bed 12 days (this period may be reduced) and to receive intramuscularly in each deltoid muscle 15 grains of bi-hydrochloride daily with 10 grains of Quinine Hydrochloride in Mixture No. 1 (*infra*) thrice daily, totalling 60 grains of Quinine daily for the 12 days. Patient is then allowed up and receives for three days Mixture No. 2 four times a day (60 grains of Quinine daily by the mouth). Patient is then put on Mixture No. 3 four times daily for 14 days (20 grains of Quinine daily). Light work allowed.

Anticachexia Mixture No. 1. For a dose after food :—

Quinine Hydrochloride 10 grains, Tincture of Ferric Chloride 5 minims, Solution of Strychnine Hydrochloride 5 minims, Hydrochloric Solution of Arsenic 5 minims, Dilute Nitro-Hydrochloric Acid 5 minims, Magnesium Sulphate ½ drachm, Syrup of Tolu ½ drachm, Glycerin 10 minims, Water to 1 ounce.

Anticachexia Mixture No. 2.

As No. 1, but *add* Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims to the dose.

Anticachexia Mixture No. 3.

As No. 1, but *reduce* the Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims in each dose.—B.M.J. i./18,428.

In the majority of relapsing cases, ***Quinine per os is adequate—20 grains*** either daily or twice weekly during stay in hospital. Where this is inadequate combined oral and intramuscular administration (60 grains daily for 4 days).—E. B. Gunson and co-workers, L. i./18,866; W. Fletcher, L. ii./18,432.

In 'anti-relapse quinine prophylaxis' a short intensive treatment, *e.g.*, up to 180 grains of sulphate or hydrochloride in 3 days, effects cure in a substantial proportion of cases.—L. i./18,301.

Relapses can be cut short by Quinine Sulphate in solution 10 grains three times a day for a week. After the week give 10 grains regularly once a day.—Sir Ronald Ross, per T. H. Jamieson, B.M.J. i./19,739.

Prophylactic Use.

Prevention. It has been proved by Warrington Yorke, S. I James and others, that Quinine given to a patient just previously t his being bitten by infected mosquitoes is of no avail in preventin or delaying the onset of the attack. It is important to know whethe other remedies may be effective in this way.

On the first day of the month give a dose of Calomel and after the bowe are well cleared, 15 grains of Sulphate in dilute acid after a good meal. Repea this on the 15th of the month. Pay attention to bowels at all times.—H Yeates, B.M.J. i./18,603.

The only prophylactic for troops is 1/20 grain Arsenious Acid daily. Quinin is curative *only*.—C. A. Johnston, B.M.J. i./18,586.

Thorough treatment ranging from 5 to 10 grains on two successive day per week up to 20 grains daily, failed to prevent incidence of malaria in Salonic in 1916-17. It was estimated that at least 80 to 90% of units were infecte The prophylactic quinine was dropped in 1918 as no dose that could be tolerate had any protective value to troops exposed under campaigning conditions.— G. T. Rawnsley, B.M.J. i./19,501.

Quinine prophylaxis is a *so-called* preventive measure. The late J. C McWalter at the Cambridge B.M.A. Meeting, 1920, exploded the doctrine tha Quinine *prevented* malaria. Capt. Cecil Alport in "Malaria and Its Treatment shows that the treatment at Salonika was a colossal and expensive failure. A good mosquito net is the best preventive.

The difficulty of getting natives to take Quinine prophylactically, or afte discharge from hospital, overcome by issuing pink sugar-coated tablets, calle 'Pink Tonic Tablets,' containing Quinine 2 grains, Reduced Iron ¾ grain Arsenious Acid 1/50 grain, Extract Nux Vomica ⅛ grain. Effects beneficia and tablets readily taken.—U.F.C., '25,112.

No general rule can be prescribed for Quinine prophylaxis.—Can only be decided for each individual, or body of individuals when all circumstances relative to malaria in the particular place are known The investigations of several workers to solve the question, "Must a ma coming home from the tropics continue to take Quinine?"—the answer "Yes." A study of induced malaria.—Lt. Col. S. P. James, T.R.S.T.M. Mar. 13, '31,477.

Malaria during Pregnancy.

Experiments showed that Quinine in certain concentrations causes con traction of both the longitudinal and circular fibres of the uterus. 1 in 300,00 has no effect. 1in 44,000 produces a tonic spasm which, if sustained, woul cause asphyxia of the fœtus from constrictions of the placental sinus. Thi concentration could only occur if the patient was nearly poisoned with Quinine

Therapeutically, as soon as malaria is diagnosed, which is a matter o urgency in pregnancy, give Quinine or Quinidine at once. Divide dosage int 2½ or 5 grain doses every 2 or 4 hours.—H. W. Acton, L. i./21,216.

The treatment of malaria in pregnant women.—J. Dhairyam, I.M.G April, '25,165.

Heavy doses of Quinine given in malaria during pregnancy, *e.g.*, 16 Gm (*per os* and intramuscularly) in 7 days, and 31 Gm. in 17 days. Children bor alive and well.—Adam, per Chininum, 134.

The ecbolic action of Quinine is negligible during the early months of preg nancy, and in the later stages it may be combined with an opiate. Quinin treatment should be instituted in all pregnant malaria patients.—Per Pres Nov., '28,373.

Malaria in England.

Fatal cases of æstivo-autumnal malarial fever in England.—A. J. Hal E. H. Williams and J. S. C. Douglas, L. i./18,734.

Treatment in England. Discussion of Quinine Dosage.—B.M.J. ii./19,744 see also Sir W. H. Willcox, *ibid.*, 796 and L. ii./19,1105; Sir R. Ross, 863 T. H. Jamieson, L. ii./19,266; S. P. James, *ibid.*, 1016.

Antimalarial measures in England. Dangerous areas and Quinine pro phylaxis.—A. Macdonald, B.M.J i./19,669.

Anopheline Mosquitoes in Great Britain. Three species of Anophel indigenous in Great Britain. Of these, two—*A. Maculipennis* and *A. Bifurcatu* —are known to be malaria carriers, but in view of relative infrequency an

many other factors, can hardly be viewed as a source of danger in spreading malaria.—B.M.J. ii./18,63. See also L. ii./18,151 and B.M.A. Discussion, B.M.J. i./19,490.

Fatal case of malignant tertian malaria contracted in North of England.—E. E. Glynn and J. C. Matthews, B.M.J. ii./20,811,871,T.D.B., Vol. 17, 1921,136.

In England, Anopheles mosquito is not a danger, thanks to efficient sanitary service. Malaria used to be quite common in this country.—A. W. Alcock, L. ii./25,34.

Benign tertian malaria in Romney Marshes in the past. Ague never seen now—due no doubt to Quinine introduction. Opium was also consumed. Gum Lodly (Laudanum) asked for in grocer's shop.—F. William Cock, B.M.J. i./31,42.

British mosquitoes. *Culex pipiens* and *Theobaldia annulata* common in all parts, the latter a fierce and poisonous biter.—J. F. Marshall, Hayling Island, L. i./30,1372.

Mosquito control in England.—L. i./31,821.

General References to Malaria.

Malarial Commission, League of Nations, Conclusions. The thirtieth anniversary of the discovery by Sir Ronald Ross that *Anopheles* mosquitoes are hosts and carriers of the malarial parasite. One of the most important conclusions is that anti-malarial measures should be limited to reduce severity and as far as possible incidence. Quinine is not an effective prophylactic for new infections and relapses. The killing of adult *Anopheles* important and should be urged by educational propaganda.—Lt.-Col. S. P. James, Adviser on Trop. Dis., Min. of Health, B.M.J. ii./27,340.

Malarial fever is the *principal and gigantic ally of barbarism*. What we call the Dark Continent should be called the Malarious Continent, and for centuries successive waves of civilisation have broken themselves in vain upon its shores.—Sir Ronald Ross, Chininum, 20.

The anti-malarial campaign during recent years—with specimens of pictorial posters as used in India, U.S.A., Dutch East Indies, Algeria, France, Roumania and Russia.—J. W. Van der Spek, Chininum, 145—172.

Italy 40 years ago formed one immense focus of malaria, but owing to continued efforts the officially infected zones now only occupy one-third of total In the last resort, it is the well-being of the population which results in the transformation and disappearance of malaria.—L. Raynaud, per Chininum, 56.

Dr. Andrew Balfour estimated the direct annual cost of sickness and death attributable to malaria in the Empire at 250,000,000 dollars to 300,000,000 dollars, and the annual **world death-roll** at 2,000,000.—Jl. A.M.A. ii./25,1571.

Report of the Malarial Research Unit in Palestine.—Jl. A.M.A. ii./25,1084.

Malaria in Europe.—L. ii./25,25.

Expenditure on mosquito eradication in many parts of the world has been more than justified, and of economic value.—J. T. Clarke, B.M.J. i./30,840.

Antimalarial action of drugs can be estimated experimentally on animals.—G. M. Findlay, B.M.J. ii./30,783.

Ross Inst. Rept., 1929.—Malarial districts—Assam, India, Ceylon—need special knowledge for control of the problem locally. Rubber growers, tea-planters, gold and tin mining companies, advised to send men to the Ross Institute for instruction.—Sir Malcolm Watson.

Ross Inst. Rept., 1930.—The fifth annual report records the work of Sir R. Ross and staff. Sir A. Castellani has continued his researches on fungi and fungal diseases and others have contributed valuable research work on tropical diseases—malaria in particular. The report details the findings of the Ross Malaria Expedition of 1928-29 in India and Burma, and gives maps, statistics, and a list of publications of interest and importance.

Ill Effects from Quinine.

QUININE AMBLYOPIA.—12 5-grain tablets of Quinine caused giddiness, nausea, vomiting and loss of sight within three hours. Recovery under Amyl Nitrite inhalation and Sodium Nitrite in 2 grain doses.—H. and R. Gainsborough, per Pres., Feb., '23,75.

Quinine Hydrochloride, 39 grains in a malaria patient, caused severe vomiting, deafness and dilation of pupils. Total blindness for 7 weeks, after which vision was restored for 2 months, permanent blindness supervening Possibly due to the effects of Alcohol and tobacco on the nerve fibres and ganglion cells.—J. S. Du Toit, per T.D.B. 19/22,710.

Quinine blindness caused by 20 Gm. Stomach lavage, enemata, etc Central vision reappeared after 15 days, but peripheral vision and vision fo colours returned more slowly.—Pres., Jan., 1913,203.

60 grains of quinine in hot whisky and water caused delirium and collaps An enema of hot coffee, strychnine and digitalin hypodermically, and ho bottles produced rapid improvement. The quinine acted as depressant t the respiratory and cardiac systems.—H. Gooch, B.M.J. ii./26,115.

DEAFNESS.—All perception of light lost and deafness caused by quinin sulphate 30 grains, lasting for months.—F. C. Plummer, B.M.J. ii./25,1062.

Quinine over lengthy periods will produce deafness.—A. S. Gubb, B.M.J i./20,131.

Death from 48 5-grain Quinine Bisulphate Tablets.—H. M. Raven, B.M.J ii./27,59.

URTICARIA following Quinine treatment of malaria. One cured by injection of Adrenalin and the other by Calcium Lactate *per os*.—Maj. T. A. Hughes I.M.G., Jan., '26,7.

Acute cinchonism produced by Quinine Sulphate; 200 grains taken durin 72 hours, together with a like amount of Potassium Bromide.—G. P. Adshead Jl. R.N.M.S., April, '26,145.

Further on Quinine from various aspects, see Vol. II., q.v. also fo Malarial Parasites. Induced Malaria for G.P.I., see *Paralysis*— Therapeutic Index, this Volume.

***Plasmoquine** (T.M. 474634) **Simplex.** *Syn.* *PLASHMOCHIN (T.M. 466698) BEPROCHIN. $C_{19}H_{29}ON_3 = 315{\cdot}2502$.

An Alkyl-aminoquinoline derivative. Slightly soluble in water

The use of this drug in malaria has been a process of development For a number of expressions of opinion, 1927-28, see Edn. XIX. p. 750. *The following are recent statements arranged chronologically.*— Plasmoquine is discontinued in favour of :—

***Plasmoquine Compound.** *Syn.* BEPROCHIN COMPOUND.

Tablets contain 0·01 Gm. Plasmoquine and 0·125 Gm. Quinin Sulphate.

The following scheme of dosage and treatment is now advised 1st week, 7 days 2 tablets thrice daily (0·06 Gm. Plasmoquine, plus 0·75 Gm. Quinine thrice daily) : then a further 4 weeks' treatmen (with 4 days' interval between each week) of 12 tablets daily. In subtertian malaria the first period should be 5 days, followed by 4 days' break, and the subsequent 5 courses of 5 days each instead of 7 Tablets now contain twice the amount formally dispensed.

Does not replace Quinine, but affords an alternative treatment in patients unable to take Quinine. Occasional signs of relative in tolerance are slight cyanosis, dyspepsia, colic, and splenic pain.— P. Manson-Bahr, L. ii./28,497.

In general, harmless. Destruction on gametes evident, but large-scal experiments needed to prove efficacy.—De Melo, Jl. A.M.A. ii./29,1768 Harmless in Quinine hæmoglobinuria when taken after attack has subsided.— *Ibid.*, 1770.

No one should take Plasmoquine who is not under close daily medical super vision. It cannot replace Quinine in the mass treatment of malaria.—L ii./29,834.

The late Sir A. Balfour recommended the use of Plasmoquine in tertia infections—1 to 2 tablets 5 times a day. In æstivo-autumnal or doubl infections Plasmoquine Compound one tablet five times a day.—Jl. Roy Soc. Trop. Med., Jan. 30, '29,399.

Prevention of malaria. **Beprochin** had prophylactic powers.—Lt.-Co S. P. James and co-workers, L. i./31,1248. " England should have done it."— W. H. M.

An effective prophylactic against malarial infection.—S. P. James, W. D. Nicol and P. G. Shute, L. ii./31,342. See also P. Manson-Bahr, *ibid.*, 425. A review of recent experiences.—*Ibid.*, 535.

In malignant tertian malaria not more effective in preventing relapses than Quinine. A drug needed with the same action but less toxic and which would not only cure attacks, but prevent relapses. Before attributing remarkable curative properties to a new anti-malarial one should ascertain whether cases could not be as easily cured with moderately small doses of Quinine.—Col. S. P. James, B.M.J. i./32,101. Quinine is one of the most remarkable drugs ever known, and little is known of its action and the factors governing its action.—Prof. Warrington Yorke, *ibid.* Plasmoquine highly specific for *Plasmodium vivax* but much less so for the merozoites of the subtertian. Of value in pregnancy and in the convalescent stages of blackwater fever. There is undoubtedly idiosyncrasy to it as to Quinine.—P. H. Manson-Bahr, *ibid.*

Alone it has no anti-relapse effect but given with Quinine it has.—Lt.-Col. S. P. James, R.S.T.M. June 16, '32.

✱**Atebrin** (T.M. 349660). *Syn.* **Erion.** A new anti-malarial synthetic allied to Plasmoquine, soluble in water with bright yellow colour and fluorescence. Tablets contain 0·1 Gm.

Dose.—0·3 Gm. daily for 5 days.

Used in malignant tertian malaria, in only 1 of 17 cases did it fail to effect permanent cure. Action the reverse of Plasmoquine, *i.e.* of little use prophylactically.—S. P. James and Co-workers, L. i./32,1062.

Compares favourably with Quinine and superior in preventing relapses.—R. Green, L. i./32,826: see also *ibid.* 847, and Prof. W. Schulemann, B.M.J. i./32,100.

RESORCINUM.

Syn. **Resorcinol.** *B.P.* '14., P. Ital. V., P. Belg. IV., F.E. VIII. (latter specifies for *external* use). $C_6H_4(OH)_2$=110·0468. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Metadihydroxybenzene is in white crystalline plates, melts at 230° F. (=110° C.) and is easily volatilised. Preserve from light.

Manufacture.—Benzol-Disulphonic Acid is prepared by heating Benzol with fuming Sulphuric Acid and the liquor poured into water to which Milk of Lime is added. The solution is filtered and the filtrate treated with Sodium Carbonate. It is again filtered and the filtrate evaporated and afterwards fused with Sodium Hydrate. The melt is cooled and dissolved in water, acidified with Hydrochloric Acid and, after boiling off the Sulphur Dioxide and filtering off tarry matter, is extracted with Ether and then recrystallised from Benzol. For a more detailed account, see Edn. XVII, Vol. I, p. 681.

Soluble 1 in 1 of water, 2 in 1 of alcohol, 1 in 20 of olive oil.

Incompatible with Spt. of Nitrous Ether, and caustic alkalis.

Uses.—Resorcin has useful antiseptic properties. It coagulates albumin, and has a caustic action on the skin, but a 2% solution is not irritating. A 5% solution may be injected into the bladder without causing any irritation, in inflammatory affections of this organ, likewise in vesical catarrh after gonorrhœa; 5 to 10% solution is of service also in syphilitic sores and skin diseases; and a 1% solution is useful as an eye lotion in conjunctivitis. Given internally, *but with great care,* it has been used as an antipyretic but it cannot be recommended. In whooping cough and hay fever, 10 minims of 2% solution, or this strength used as spray, is of service. Epithelioma and rodent ulcer have been treated with ointments and plaster up to 30% strength. It is applied locally to condylomata and mucous patches. A pigment of 10% relieves irritation of tubercle of larynx.

For eczema and alopecia, cold cream with 2% of Resorcin is useful. In the form of paste it has proved useful in ichthyosis—favours desquamation and removes effete horny layer.

In gastric ulcer 2 to 5 grain doses have antiseptic action.

Resorcin is dangerous over large surfaces. A paste containing 25 to 30% Resorcin in Gelanthum proved fatal.

Tablets, 3 grains (0·2 Gm.). *Dose.*—1 to 3.

Glycerinum Resorcin, G.H.

Resorcin 4, Distilled Water 4, Glycerin to 15.

In chronic urethritis resisting treatment, a single injection (25% Resorcin) in fresh cases has been found beneficial.

Lotio Resorcini. *Syn.* SPIRITUS CAPILLARIS.

Resorcin 1, Ether 1, Castor Oil 1, Eau de Cologne 10, Alcohol (90%) 35. Useful for dandruff and alopecia. *Soap and alkali must be removed before use, or hair may be discoloured.*

Lotio Resorcin et Acidi Salicylici.

Salicylic Acid 30 grains, Resorcin 1 drachm, Spirit of Rosemary 1 ounce, Saponin 1 drachm, Lanolin 1 ounce, Aqua Mellis to 10 ounces. Dissolve the Salicylic Acid and Resorcin in the Spirit of Rosemary, melt the Lanolin, add the Saponin dissolved in a little water, place in a warmed mortar, add the Spirituous Solution just mentioned and the Aqua Mellis in parts to make a cream.

Lotio Resorcini Composita, St. M.'s H.

Resorcin 10 grains, Methylated Spirit 1 drachm, Water to 1 ounce.

Lotio Capillaris.—A stimulant to the growth of hair. Resorcin 5, Capsicum Tincture 15, Otto of Rose *q.s.* Castor Oil 10, Alcohol 90% to 100.

℗**Lotio Excitans, St. G. H.** For the scalp.

Resorcin 5 grains, Mercuric Chloride ½ grain, Glacial Acetic Acid 3 minims, Chloral Hydrate 10 grains, Cantharides Tincture 20 minims, Alcohol 60% to 1 ounce.

℗St. J. H. has Mercuric Chloride 10 grains, Glacial Acetic Acid 30 grains, Chloral Hydrate 3 drachms, Tincture of Cantharides 1 ounce, Alcohol 60% to 1 pint.

℗**Lotio Resorcini Pilocarpinæ et Cantharidis.**

Resorcin 80 grains, Pilocarpine Hydrochloride 15 grains, Cantharides Tincture 1½ ounces, Tincture of Capsicum 4 drachms, Spirit of Camphor 6 drachms, Castor Oil 10 to 60 minims, Oil of Lavender 30 minims, Alcohol 90% to 8 ounces. A useful stimulating lotion in alopecia prematura for use after exfoliative treatment.

Lotio Resorcini et Acidi Borici.

Resorcin 1, Compound Tincture of Lavender 10, Glycerin 10 Saturated Solution of Boric Acid 80, as a mouth wash.

Nebula Resorcini.—For a cold, spray nostrils with 1% solution.

Gargarisma Resorcin, E.L.

Resorcin 15 grains, Glycerin 1 drachm, Water to 1 ounce.

Unguentum Resorcini, R.O.H. Resorcin 8 grains, Soft Paraffin to 1 ounce.

Unguentum Resorcini Compositum. **Ihle's Paste.** St. J. H.
Resorcin, Zinc Oxide, Starch, of each 5% approx. in Soft Paraffin.
Has been used stronger for bromide acne.
Resorcin liquefies with Menthol, Camphor or Phenol, and a small amount of any of these may well be added so as to form a uniform ointment.

Unguentum Resorcini et Acidi Salicylici. *Syn.* CASTELLANI'S OINTMENT.
Resorcin 60 grains, Salicylic Acid 10 grains, Lanolin and Soft Paraffin to 1 ounce.
The most popular remedy for Dhobie itch in Africa and Asia.

Pasta Resorcini Fortior (Lassar and St. M.'s H.).
Resorcin 20, Zinc Oxide 20, Starch 20, Liquid Paraffin 40
'Mitis' 10, 25, 25 and 40 respectively.

Pasta Resorcini et Zinci Oxidi, K.C.H.
Resorcin 1, Glycerin 1, Zinc Oxide 1, Paraffin Ointment (white) to 8.
Baculum Resorcini.—Resorcin 3, Wax 2, Lanolin 5.

Resorcin Monacetate. *Syn.* ✱**Euresol** (T.M. 355476).
Manufacture.—Mix Resorcin 440 and Acetyl Chloride 320 and allow to interact completely in an open dish. Then heat to 100° C. for ½ hour. Cool, wash free from acid with water, and dry over exsiccated Sodium Carbonate.
A honey-like mass. Dissolves 10 to 30% in acetone, for use in acne, seborrhœa and sycosis. **Euresol pro Capillis** is the same perfumed. It is directed to be made into a Hair Lotion by mixing 2 parts with Alcohol 70%, 32 and Water to 48. Removes dandruff and itching.

Thio-resorcin. Yellowish powder slightly soluble in alcohol; as a substitute for Iodoform; 5% Ointment in skin diseases.

Hexyl-Resorcin. *Syn.* ✱CAPROKOL (T.M. 460019).
1 : 3 DIHYDROXY-4-HEXYLBENZOL, $C_6H_3(OH)_2.(CH_2)_5.CH_3$. = 194·1404.
Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) thrice daily.
Patents.—The manufacture of Hexyl-Resorcinol and allied compounds is covered by a number of British Patents dating from 1923, owned by American manufacturers. In 1927 they were the subject of an action in the Courts Details in Edn. XIX, p. 753.
The compound is a stable one, forming white crystals, M.pt. 65° C., soluble in water 1 in 1,700, readily in Ether, Chloroform and Alcohol, and in oils.
Uses.—A powerful germicide, the Phenol Coefficient ranging from 46-52. Its power is retained in both acid or alkaline urine even in high dilution. Given by the mouth, the compound is secreted in the urine at a rate producing continuous action in the urinary tract. Chronic *B. coli* infections and *Staphylococcus* infections have been treated with it; it acts best in early cases. Pyelitis and cystitis caused by organisms other than *B. coli* are cleared up in a few weeks. *B. coli* infections require, on the average, about as many months. It is of value in disinfection of wounds draining the urinary tract, and tuberculosis of the urinary tract. Continue treatment until sterility of the urine has persisted for a fortnight at least.

Gelatin Capsules containing 0·15 Gm. in 25% Olive Oil Solution are taken *immediately after* each meal thrice daily, *three to four* being taken on each occasion; they must not be taken on an empty stomach. *B. coli* infection may need 60 to 90 days' continuous treatment.

Caprokol Solution *for children* is made, each drachm containing 0·1 Gm. in 2½% solution in Olive Oil.

In the preliminary experiments a total of 45 Gm. produced no toxic symptoms, but since then much larger amounts have been given without toxic effects. Urinary tract infections due to *Staphylococcus albus*, *Staphylococcus aureus*, *Streptococci*, some strains of *B. pyocyaneus* and *B. coli* have been cleared up with Hexyl-Resorcin alone by mouth.—V. Leonard, Jl. A.M.A., Dec. 20, 1924.

The bactericidal power is probably due to its being a powerful surface tension reducent. Hence administration of Sodium Bicarbonate is contraindicated and ***excessive intake of fluids must be avoided,*** as they both increase the surface tension of the urine and rob the compound of bactericidal action. So far as is known, nephritis is not a contraindication. Children seem to tolerate relatively larger doses than adults.—V. Leonard and A. Wood, Jl. A.M.A. ii./25,1855—59.

PYELITIS.—Successful in only 1 case out of 14.—Am. Jl. Dis. Child., Sept., '26, per Jl. A.M.A. i./26,1506.

PYELONEPHRITIS, CHRONIC.—Improved symptoms and reduced pus in urine, but did not eradicate infection.—W. F. Braasch and E. P. Cathcart, Jl. A.M.A. i./27,1632.

About one-third of cases cured, with an additional 20% of symptomatic cures: about 43% will be improved, and 25% remain unchanged. Coccus infections respond more certainly than bacillus or mixed infections. A higher proportion of cures is likely if the treatment were combined with other methods. Details of treatment of 82 cases of acute and chronic pyelitis and prostatitis.—C. W. Eberbach and R. D. Arn, Jl. A.M.A., Aug. 14, '27,514.

Test for Hexyl-Resorcinol in body fluids.—D. C. Elliott and H. G. Barbour, Can. Med. Assn. Jl., Aug. '25,787, per Pres., Jan., '26,49.

TISSUE DISINFECTANT.—Hexyl-Resorcinol is claimed to be effective when 0·1 Gm. is dissolved in Glycerin 30 and Water 70 Cc., and pathogenic microorganisms are stated to be destroyed in less than 15 seconds. Undiluted the solution may be used for lavage of the urethra, bladder and buccal mucous membranes, and mixed with 2 vols. of water it may be instilled into the normal conjunctival sac.—B.M.J.E. ii./27,100.

For the intense pruritus of creeping eruption continuous application of 1% Hydro-Alcoholic solution successful.—G. Giglioli. Jl. Roy. Soc. Trop. Med., Jan. 30, '29, 444.

ANTHELMINTIC EFFECT (hookworm, trichinus and ascaris) stated to be good, but unlikely to displace other drugs owing to the need for strict and intelligent co-operation of patient.—L. ii./31,33.

Hexyl-Resorcin—Solution S.T. 37.

A solution in aqueous Glycerin with low surface tension (37, compared with water 77 dynes per sq. cm., and hence thought to have increased penetration. It is a non-toxic and non-irritating, antiseptic, and may be used as such or diluted with water. It is employed in mouth, nose and throat cases and for open wounds.

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*SACCHARIN (T.M. 392328, 332891, 304767, 332892).

Glusidum (*B.P.* '14) U.S. X., Ph. Ned. V., F.E. VIII., P. Ital. V. *Syn.* —GLUCUSIMIDE, *Saxin (T.M. 198,971) BENZOYL SULPHONIC IMIDE. BENZOSULPHINIDUM, ORTHOSULFIMIDUM BENZOICUM, IMIDE ORTHOSULFOBENZOIQUE, P. Belg. IV. $C_6H_4 : SO_2CO : NH$ =183·107.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

A derivative of toluol in white, intensely sweet, crystalline powder.

Its aqueous solution has an acid reaction; it forms crystalline sweet salts with alkaloids and metallic bases. Solutions of alkalis and their carbonates dissolve it, forming compounds.

Soluble 1 in 400 of water, in alcohol 90% 1 in 38, in ether 1 in 100, incompletely in chloroform, and in glycerin abou in 50, slightly in oils and fat, also in acetone.

Use.—Instead of sugar for diabetic and obese patients.

Saccharin (insoluble) is sold in sweetening powers 300, 450 and 550—the above remarks refer to "550."

Influence of Saccharin on the catalases of the blood.—Some of the recent work on Saccharin has had a tendency to ascribe to this compound an action beneficial to the processes of oxidation in the blood, particularly in diabetes. F. C. Becht finds there is no evidence that it produces any change in the catalytic power either in the positive or the negative direction *per os*. 4 Gm. per kilo is a powerful gastro-intestinal irritant. Given intravenously it produces a marked decrease in the catalase content of the blood. There is no difference from the normal in the case of an animal with pancreatic diabetes. —Jl. Pharm. and Exp. Therap., Oct., 1920.

Glusidum Solubile, U.S. X. $C_6H_4.SO_2CO.NNa.2H_2O=241{\cdot}1274$. *Syn.* **Saccharinum Solubile,** P.G. VI. contains about 90% of Saccharin in combination with soda. In yellowish granular, micro-crystalline masses, easily soluble in water, and therefore convenient for flavouring purposes. 1 in 2,000, or 2 grains to an 8-ounce mixture, is sufficient.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

Elixir Glusidi, B.P.C.—*Syn.* **Elixir of Saccharin.** *Dose.*—5 to 20 minims. Gluside 5, Sodium Bicarbonate 3, Alcohol 12·5, Distilled Water *q.s.* to 100. 1% added to mixtures for flavouring.

Saccharin Tablets. Contain ½ grain with Sodium Bicarbonate *q.s.*

Dulcin. *p*-PHENETOLCARBAMIDE, P.G. VI.

$C_2H_5.OC_2H_5.NH.CONH_2=180{\cdot}1094$.

Dose.—Tablets are made containing ¾ grain (**0·05 Gm.**).

White crystalline powder, M.pt. 172-174° C. Slightly soluble in water, readily in Alcohol. Can be boiled. Used as a substitute for sugar, and stated to be innocuous.

SACCHARUM PURIFICATUM.

Syn. SACCHAROSE, SUCROSE. $C_{12}H_{22}O_{11}=342{\cdot}1716$.

Crystals or powder, soluble 2 in 1 of water.

In addition to the Refined Sugar obtained from the juice of the Sugar Cane—*Saccharum officinarum* (*Graminaceæ*)—various grades of granular cane and beet sugar both with and without the addition of "blue" are marketed. For the manufacture of Syrups a sugar without the colouring matter is essential. *B.P.* '14 and U.S. allow also beet sugar.

Sugar Beet Industry.

The **British Sugar (Subsidy) Act, 1925,** provides for the grant of a subsidy for the period of ten years (1924-1934) on sugar and molasses manufactured from home-grown beet. The English climate is exceptionally favourable for beet growing.

The **Subsidy Rates** on **Sugar** (exceeding 98° polarity) manufactured between 30th Sept., 1931 and 1st Oct., 1934 are 6s. 6d. per cwt. **On Molasses** (if

containing less than 70 and more than 50% of sweetening matter) made during the same period, £2 19s. 4d. per ton.

Further data on acreage, tonnage, Subsidy paid hitherto, see Edn. XIX., Vol. I, pp. 755, 756.

In the case of any new factory constructed since the Act, it is a condition of payment of subsidy that ***not less than 75% of the plant and machinery installed shall be of British manufacture*** unless the Minister of Agriculture dispenses with this condition.

How the Plant makes Sugar—a book giving a comprehensive account of the whole subject of sugar.—G. Fairrie, Liverpool, Fairrie & Co., 1925, abst. L. i./26,584

Relative Sweetness of Sugars.—If the sweetness of Sucrose is rated as 100, Levulose deserves a value of 173, Glucose 74, Maltose 32, Galactose 32, and Lactose (Milk Sugar) 16.—Jl. A.M.A. ii./25,977.

For the Estimation of Sugar by means of Polariscope and other Methods see Vol. II.

Uses.—In heart disease, as also in cancer and phthisis, large amounts are of service. It is changed into glycogen and thence to glucose in the system. It has been given ***intravenously*** as strong as a 50% solution, but an isotonic ***solution*** (920·6 grains per pint, *i.e.*, 10·5%.—P.J. i./29,325) would appear preferable. It is added to infants' foods made of dried milk.

Sugar with caraway infusion is used to hasten and increase mammary flow in Egypt, as well as to bring about a speedy involution of the uterus.

In various morbid conditions, anæmia, adynamic varieties of rheumatism in neurasthenic manifestations of neurotic persons, Cane Sugar is beneficial —¼ lb. to ½ lb. for an adult to be slowly eaten daily and a lump or two at odd times through the day or night, but not just before a meal.

CARDIOLOGY.—Incipient rheumatic endocarditis may be prevented from passing into permanent valvular disease by prolonged rest, the administration of Sodium Iodide and application of blisters.—Caton. Chronic heart failure aided by Cane Sugar.—W. Gordon, B.M.J. i./21,13.

ECZEMA, PSORIASIS AND PRURIGO well treated by intramuscular injection of 2 or 5 Cc. of an 8% solution of Saccharose.—Per. Jl. A.M.A. ii./25,1999.

ARTHRITIS. Tolerance for sugar is often diminished.—Pringle and Miller M.P.C. 31/23,85.

Syrupus (*B.P.*' 14).

Sugar 1, Water to 1½ by weight, Sp. Gr. 1·33. U.S. X. orders Sugar 85, Water to measure 100. Weaker strengths of syrup do not keep well. Potassium Carbonate 1 grain in 12 ounces of Syrup has been found to prevent crystallisation.

A few drops of Chloroform per ounce of Syrup will prevent fermentation.—C. D., Aug. 22, 1922, p. 310.

Best temperature for producing syrup free from Invert Sugar thought to be 90° C.—W. J. Beardsley and F. J. Bolton, Qtrly. Jl. Ph., '29,204.

Invert Sugar is prepared by action of dilute mineral acid on Cane Sugar. Consists of a mixture, possibly a loose combination, of equal weights of Grape Sugar (Dextrose) and Lævulose. A useful substitute for cane sugar in dyspepsia—more easily borne in gastritis.

Invert Sugar forms in simple syrup on keeping—that made by cold process produces more than hot. In 18 months it may reach 6%.—P.J. ii./16,545.

Lævulose.—*Syn.* **Diabetin, Fructose.**

$C_6H_{12}O_6 = 180{\cdot}0636$.

A whitish crystalline powder (also honey consistence), freely soluble in water, reducing Fehling's Solution. It is lævorotatory.

Manufacture from Cane Sugar. *See Edn. XIX, p.* 757.

Inulin from dahlia bulbs or chicory root which contain 6 to 12% is also suitable for producing pure Lævulose.

A stronger sweetening agent than cane sugar; has a pleasant flavour. Specially suitable for diabetics.

Jerusalem Artichokes proved beneficial in diabetics, with only slight addition to the Insulin dosage. A definite increase in blood sugar followed but less than that produced by Lævulose. Baked artichokes raised the respiratory quotient in all cases.—per Jl. A.M.A. ii./25,544.

The uses of Lævulose.—Pres., July '26,279.

Lævulose test for liver efficiency. All ordinary sugars, glucose, cane sugar, etc., when ingested, raise the concentration of sugar in the blood, but not lævulose. Thus, with 50 Gm. of glucose, the blood sugar concentration is increased in the first half hour from the usual 0·1 to 0·16 or 0·17%, returning to normal in about 1½ hours. There is no rise with lævulose. This lack of power on the part of lævulose depends on an intact liver. If there is a definite lesion of the liver, lævulose acts, more or less, like glucose, *i.e.*, there is a marked increase in blood sugar.—J. C. Spence and P. C. Brett, L. ii./21,1362; B.M.J. ii./22,1061. See also Prof. Maclean, *ibid.*, 1060 and G. King, L. i./27,388.

Lævulose Tolerance Test for hepatic efficiency in patients with epilepsy.—M. Gosden and J. Tylor Fox, L. i./29,1351.

The most valuable and sensitive of all liver function tests and best shows early impairment. A healthy liver can dispose of 50 Gm. Lævulose taken by the mouth without rise of blood sugar.—Sir Wm. Willcox, L. ii./31,3.

Galactose test for liver efficiency. Give 40 Gm. in 400 Cc. water to the fasting patient and collect samples of venous blood, at half-hourly intervals for 2 or 3 hours. There is no great rise in blood sugar curve, except where hepatic cells are grossly damaged. Thus normal persons, or those with gross obstructive jaundice, or pernicious anæmia and alcoholic jaundice, show little or no rise of blood sugar, but in those with catarrhal or toxic jaundice, with malignant disease with secondary deposits in the liver, and with cirrhosis following syphilis or alcoholism, Galactose causes definite increase in blood sugar.—D. T. Davies, L. i./27,380.

Galactose Test for hepatic efficiency better than Lævulose.—A. W. Elmer and M. Scheps, L. ii./30,187.

Identification of Inulin and Maltose by a mycological method. Tables and formulæ.—A. Castellani and F. E. Taylor, Jl. Trop. Med., Feb. 15, '23,59.

Saccharosan and Glucosan.

It has been suggested to modify Saccharose and Glucose by heat to produce carbohydrates ('Anhydro-Sugars') which can be given to diabetic patients without their affecting blood or urinary Glucose. The writer has prepared both the compounds for trial.

Animal experiments showed that Glucosan given by the mouth caused no change in the respiratory quotient and it was absorbed to the extent of only 30%, the absorbed fraction being excreted unchanged in the urine. It is unlikely therefore that the substance can be profitably included in the diet of diabetics.—B.C.A., '26,A.973.

SANTONINUM.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) in sugar. U.S. X. *Average dose.*—1 grain. Fr. Cx.: *Max. single dose,* 1½ grains; max. during 24 hours, 5 grains approx., F.E. VIII. 4 grains. Slipule No. 5 holds 2 grains

A neutral crystalline principle. The inner anhydride, or lactone of Santonic Acid, $C_{15}H_{18}O_3$=246·1404, obtained from Santonica, the dried flower-heads of *Artemisia maritima var. Stechmanniana* (*Compositæ*). *Syn.*—Levant Wormseed, *Flores Cinæ* (*Cynæ*)—P.G., Wurmsamen. Ormesukker (Danish) is a Confection of Santonica.

Artemisia maritima grows near the sea, usually near to where fresh water makes its way to the sea and the shore is subject to inundations at spring tides.—E. M. Holmes, P.J. i./30,24. Abundant on Essex coast.—J. C. Shenstone, *ibid.*, 90.

Santonin from Scottish-grown *Artemisia maritima*, 0·81%.—J. Coutts: P.J. ii./29,603.

The powdered flowers of a variety of *Artemisia maritima*, growing in the Himalayas, is an excellent substitute for the expensive (Russian origin) Santonin.—L. i./23,808.

Santonin made on large scale at Adlershof.—P.J. i./31,379.

Artemisia brevifolia (Wallich) found to contain about 1% Santonin. It occurs from Kashmir to Kumaon at 7,000 to 9,000 ft. altitude.—Prof. Greenish P.J. i./21,2.

Furthur notes on the leaves, root, stem and flowering tops of *A. Brevifolia* as a source of Santonin.—Prof. Greenish and C. W. Maplethorpe, B.P. Conf. 1923; P.J. ii./23,94.

Brevifolin is a member of the aromatic ketone series associated with the naturally-occurring *l*-camphor—also a ketone—and with the terpenes natural to the herb *Artemisia brevifolia*.—T. H. Smith, P.J. ii./29,604.

The examination of true and false Santonicas.—T. E. Wallis and E. J. Mowat, P.J. ii./25,149.

Soluble 1 in 40 Alcohol 90% and in Oils (1 in 200 of Castor Oil), in Chloroform 1 in 3. Also in Caustic Soda Solution. Insoluble in water. Turns yellow in sunlight.

P.G. VI. gives a test for the presence of foreign organic matter, alkaloids and Artemisin in Santonin. P. Ital. tests for Salicin, Brucine, Sugar, etc

Uses.—It is an anthelmintic for round (*Lumbrici*) and thread-worms (*Ascarides*), but is inoperative against tapeworm (*Tænia*). It colours the urine orange, and in too large a dose may cause objects to appear of a green or yellow colour. A greenish yellow or saffron colour may be produced in the urine, and if the urine be alkaline a purplish red. A 2 or 3 grain dose of Calomel is given after a dose of Santonin, followed by a saline purge six hours afterwards, the flow of bile being particularly useful in making the worm let go its hold.

As an anthelmintic it is very active in an oily solution, *e.g.*, **Haustus Santonini et Olei Ricini**, Santonin in powder 4 grains, Castor Oil 3 drachms. Mix and emulsify with Mucilage of Acacia 4 drachms, Syrup 1 drachm, Saccharin ½ grain, Peppermint Water to 1½ ounces. Taken fasting in the morning this makes a dose for a child of 6 to 12 years, *but caution.*—***Poisoning has occurred by Santonin given in oily solution.*** Given in powder it is not absorbed and consequently is non-toxic though acting equally well on the parasites. The usual custom is to give the Santonin in powder on two or three nights, following by Castor Oil *in the morning.*

The general opinion seems to be that ***Salts, not Castor Oil,*** should be used as a 'wash out' after giving Santonin.—Paterson.

Santonin poisoning by ½ grain. This dose in two drachms of Castor Oil brought away from a five-year-old girl a large number of thread worms and a few round worms, but the child became weak and looked like dying. After three weeks recovered, but was completely blind and remained so for three months.—L. ii./10,1693.

URINARY INCONTINENCE.—Santonin may effect a cure.

Pills and Tablets, ⅓, ½, 1, 2 and 3 grains. *Dose.*—As Santonin.

Confectio Santonini Composita. E. L.

Dose.—1 drachm for a child 2 to 5 years.

Santonin 1, Powdered Ginger 1, Jalap 3, Sulphur 4, Senna Confection 51.

Pulvis Santonini Compositus, GT. ORM. H.

Santonin $1\frac{1}{2}$ grains, Compound Scammony Powder 2 grains, Calomel $\frac{1}{2}$ grain. Castor Oil or a saline next morning.

Trochisci Santonini. (*B.P.*' 14) 1 grain (**0·06 Gm.**) in each; one every night for a few nights then an early morning aperient.

Suppositorium Santonini contains 3 grains (**0·2 Gm.**) or more. Should be inserted every 2nd or 3rd night, for three times.

Golden Santonin. *Syn.* CHROMO-SANTONIN.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A modification of ordinary Santonin formed by exposure to sunlight.

ENTERIC is stated to have been usefully treated, also a type of 'sprue' (3 grain doses morning and evening in oil), and dysentery.

Sodii Santoninas, $NaC_{15}H_{19}O_4.3\frac{1}{2}H_2O=349{\cdot}1998$.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) for adults. White crystals. Should in preference be given in Salol-coated pills or stearettes.

Has been used as anthelmintic.—T. A. Henry, P.J. i./23,28. Further details, Edn. XIX, p. 760.

SAPONES.

Sapo Animalis or Curd Soap is mainly Sodium Stearate. **Sapo Durus** or Castile Soap is mainly Sodium Oleate. **Sapo Mollis** (all are *B.P.*' 14) *Syn.* Sapo Viridis, is mainly Potassium Oleate (made with Olive Oil; U.S. Linseed Oil).

Sapo Medicatus, P.G. VI. is made from Lard and Olive Oil and is chiefly Sodium Oleate.

Sapo Kalinus, P.G. VI., P. Austr. is made with Linseed Oil. Soluble about 1 in 4 water and 1 in 1 alcohol 90%.

Sapo Amygdalinus, F.E. VIII. is made of Almond Oil and Caustic Soda.

Saponification is outlined in Vol. II, in which also are details on the composition of Pharmacopœial Soaps, Toilet, Shaving and other Soaps, the use of Resin and Mottle, Transparent Soap, Saponification Nos. of Oils, etc.

Sodii Oleas. *Syn.* EUNATROL.

$CH_3(CH_2)_7CH : CH(CH_2)_7,COONa=304{\cdot}2544$.

In 2 and 4-grain pills and is given to dissolve gallstones. Useful as cholagogue. **Capsulæ Sodii Oleatis** contain 5 grains.

Capsulæ Sodii Oleatis Compositæ.—*Martindale.*

Dose.—One night and morning or 2 at night with hot water.

Sodium Oleate 1 grain, Phenolphthalein $\frac{1}{3}$ grain, Salicylic Acid $1\frac{1}{2}$ grains, Menthol, 1 grain. A mildly aperient antiseptic for gallstones.

CARCINOMA treated with Sodium Oleate by J. H. Webb (Melbourne) on **Shaw-Mackenzie's Theory** that Sodium Oleate and various tissue extracts act as co-enzymes, *i.e.*, activating the dormant *Prolipase*. 20 grains of Sodium Oleate daily in pill form for a year and 30 injections of 10 Cc. of Sodium Oleate solution—beginning with $\frac{1}{2}$% and increasing to 5%—Albert Wilson, Edin. Med. Jl., May, '25,248-9. *cf.* pp. 755, 756.

Sterules of Sodium Oleate 0·8% 2 Cc. and 1% 1 Cc. **are made.**
Oleic Acid and Sodium Oleate were found on injection to modify the growth of tumours, confirming the clinical observations of Shaw-Mackenzie in 1913. The procedure might be useful to prevent regrowth after operation.—L. i./25,1193.

Subcutaneous injections of 1 to 3 Cc. of Sodium Oleate solution 0·8% have been found of benefit in cancer of the breast.—J. Shaw Mackenzie, Jl. Trop. Med., April 1, '27,85.

Sapo Superadipatus, Ph. Ned. V.
Anhydrous Wool Fat 4, Potash Soap 16, Hard Soap 80.

Sapo Superadipatus cum Pice Liquida, Ph. Ned. V.
Anhydrous Wool Fat 4, Liquid Tar 5, Potash Soap 11, Hard Soap 80.

Sapo Superadipatus cum Sulfure Precipitato, Ph. Ned. V.
Anhydrous Wool Fat 4, Precipitated Sulphur 10, Potash Soap 16, Hard Soap 70.

Sapo Mollis Peroleatus.—Tallow 32, Olive Oil 5, Potassium Hydroxide 3, Sodium Hydroxide 2, Borax ¼, Distilled Water 100. Dissolve the Potassium and Sodium Hydroxides and Borax in Water, then heat to boiling, add the tallow and oil—boil until well saponified and proper consistency when cold.—Ex Edinburgh Infirmary Pharm.

To Soften Water, *i.e.*, to precipitate Calcium Salts, to prevent them forming insoluble soaps in lathering, add a little Sodium or Potassium Carbonate. Filtration through wood ashes was formerly used for laundry work. For **Chalky** and other **Waters**, see *Vol. II.*

Medicated Soaps.

Ⓟ Biniodide, containing ½%, 1% and 3% mercuric potassium iodide, reliable antiseptic.
Carbolic, toilet and medicinal, strength 5%, 10% and 20%.
Formosyl toilet and medical 10%.
Ichthyol 5% and 10%, in skin affections.
Ichthyol and Salicylic Acid.
,, ,, Sulphur 5% each.
Lanolin and Ichthyol.
✱ Neko (T.M. 482656), 1% Pot. Merc. Iodide, for skin affns., wounds and instruments.
✱ Sphagnol (T.M. 246705) 5 and 15%.
Ⓟ Sublimate 1%.
Sulphur, Camphor and Balsam of Peru, of each 5%.
Sulphur, Camphor, and Carbolic Acid of each 5%.
✱ Vinolia (T.M. numerous) medical.
✱ Wright's Coal Tar contains the equivalent of 15% of phenol combined to be unirritating. The oils for scenting are of the highest antiseptic value, containing, *e.g.* thymol, carvacrol and cinnamic aldehyde.—*cf.* Essential Oils, *Vol. II.*

For details of the manufacture of **Medicated Soaps** (direct from Cocoa Nut Oil and Soda Lye), *vide* E.P., XV, p. 713.

The preparation of Benzene and Turpentine Soaps, the latter having considerable bleaching power.—P.J. ii./27,514.

Linimentum Saponis (*B.P.* '14). Soft Soap 4, Camphor 2, Oil of Rosemary 0·75, Distilled Water 8·5, Alcohol 90% to 50.

Epidermophytosis well treated by U.S.P. Soap Liniment. Whitfield's Ointment disappointing.—C. S. Butler and co-workers, Int. Conf. Trop. Am., '24,522.

Spiritus Saponis Kalinus (Spiritus Saponatus, P.G. VI.).

Saponify Olive Oil 6, with Liquor Potassæ (15%) 7, and Alcohol 7½ by agitation until it mixes clear with alcohol and water. Add then Alcohol 22½ and Water 17; filter.

Soap and Spirit Lotion. Soft Soap 1, in Alcohol 90% *q.s.* to 2.

Spiritus Saponis Kalini, P.G. VI. is a solution of Potash Soap 1, in Alcohol (90%) 1.

Ether Soap.

Dissolve Soft Soap 32 in Alcohol (90%) 20, allow them to stand 24 hours and decant carefully from any sediment, then add Methylated Ether Sp. Gr. 0·720, 52 parts. As a detergent prior to operation.

Ⓟ**Ether Soap with Mercuric Iodide,** contains 1 in 1,800.

Mercuric Iodide 25 grains, Potassium Iodide ½ ounce, Soft Soap 2 lbs., Alcohol 90% 1 pint, Ether *q.s.* to 5 pints.

***Formosyl Glycerin Soap.** (*Distinguish from 'Formosyl.'*)

A yellowish liquid (prepared scented and unscented) containing 40% of Glycerin. A bland and soothing preparation for delicate skins. It is a constituent of **Salicifrice.**

***Sterilla** (T.M. 300899).—A Liquid Surgical Antiseptic Soap

***Synol Soap** (T.M. 362164).—A liquid soap containing Cresols and Camphor.

Pasta Mackintosh. MACKINTOSH PASTE R.V.I.

Soft Soap 7, Powdered Pumice Stone 7, Prepared Chalk 7, Water 1, Cyllin 1.

Aluminium Soaps are used in water-proofing textiles, and in making certain plastic materials used as substitutes for rubber, leather and celluloid, also (**Aluminium Stearate**) as lubricating oil thickeners.

Ammonium Soaps are employed in vanishing creams and other toilet preparations. **Ethanolamine** is a substituted ammonia made from ethylene, present in the gases evolved from oil wells. Ethanolamine soaps are in the experimental stage, but may find uses as emulsifiers and as absorbents for acid fumes.

Copper Soaps are used for preserving fishing nets and in making anti-fouling paints for ships' bottoms, depending on the poisonous properties of copper salts.

Soap and water washing proved to be of ***poor value*** in washing woollen undergarments. Garments when washed with soap and water were found to contain dead skin cells, sticky lime and magnesium salts of fatty acids, along with a quantity of other bodily secretion and organisms. Bolton advises that no soap should be used for washing garments worn next the skin.

Bolton's method of washing garments worn next to the skin.

Turn the garment inside out, soak in warm water for 10 to 30 minutes and wring it out. Then soak the squeezed garment in a wood or earthenware bucket of cold water containing about ½ ounce Hydrochloric Acid B.P., which should make the bath slightly acid to the tongue, for about 10 minutes: wring out, and rinse in warm water. Then soak in a bucket of warm water containing about ½ ounce of Strong Ammonia for about 10 minutes and work it about. Wring out, repeat with Ammonia if necessary and finally rinse in warm water. The Hydrochloric Acid dissolves the Lime, Magnesium, and Iron compounds which have been formed by interaction of the salts in the perspiration, and by the fatty acids of the skin fat. The Ammonia saponifies the fatty acids from the sweat fat still remaining undissolved as soluble salts.

The same process can be used for *sponges* and for the human body.

Search for a specific treatment of tuberculosis.

The main idea underlying treatment in bacterial disease, it is suggested, is the production of the lipolytic or ***fat-splitting ferment lipase*** in the tissues. Serum proteins, various tissue extracts, Sodium Oleate and inorganic Calcium Salts will stimulate this lipolytic action. The same principle in part underlies treatment by vaccines and tuberculins in which enzymes and lipoids are present in varying degree. The tubercle bacillus is known to contain protein, lipoids, fatty acids, phosphate and calcium in addition to a large amount of fats and waxes. In view of this interpretation of the action of vaccines and tuberculins, the products of ferment and bacterial digestion may prove more serviceable than vaccines. It is noted that the serum of patients recovered from tuberculosis markedly accelerates or activates the fat-splitting action, compared with a decreased power in the acute stages. The former contains the products of digested or partially digested tubercle bacilli, the result of lipolytic or bactericidal action. Such products—fatty acids or particular soaps derived from the action of the lipolytic ferment on the fats and lipoids of the tubercle bacilli may be not only protective or act as stimulants of lipolytic activity but the initial action of the ferment may liberate other contained activators.—J. A. Shaw-Mackenzie, B.M.J. i./21,402, The idea has been made use of in the **Sodium Morrhuate Treatment,** *q.v.*

See also p. 753, *Carcinoma treated.*

Blood serum of recovered mice shows that a natural and increased production of lipase and of fatty acids in the tissues are important factors in the protective mechanism. Sodium Oleate, *inter alia*, increases the action of lipase *in vivo* and *in vitro* (J. A. Shaw-Mackenzie).—W. J. Simpson, L. i./22, 404 ; *cf.* our p. 753.

Lipase Preparation for Injection.

A highly active Glycerin suspension of Castor Oil Lipase, made according to the method of Armstrong and Gosney, was prepared in the author's laboratories in 1927. Castor Oil Lipase material, kept dry for two years, lost its lipolytic activity. It was proved that treatment of the Lipase material with 5% Sodium Chloride did not appreciably alter its activity, also that a clear filtrate, *e.g.*, after centrifugalising a suspension of de-ricinised material in 50% Glycerin and Water was ***void of fat-splitting power.*** The conclusion of the experiments was that such a preparation was useless for clinical use, being toxic. A Soy Bean extractive was also unsatisfactory.

SINAPIS.

Mustard.

The dried ripe seeds of *Brassica nigra* (*Semen Sinapis*, P.G.V., P. Austr., F.E. VIII., P. Ital., P. Belg. IV.), and *B. alba* (*N.O. Cruciferæ*), powdered and mixed. The condiment sold as mustard consists of this mixture from which the cortical portion of the black seed has been removed.

Uses.—As an emetic a tablespoonful in half a pint of warm water. In small doses is a stomachic and appetiser. Externally a counter irritant when applied as a poultice, or added to hot water and used as a foot bath. It may blister tender skins.

Linimentum Sinapis (*B.P.* '14).

Volatile Oil of Mustard 3·5% in a Castor Oil, Camphor and Alcohol mixture.

Oleum Sinapis Expressum. Sp. Gr. 0·921 to 0·923.

The average content of Expressed Oil in the black seeds is 26%. In the white 27%. Used as a rubefacient.

Comparison of Chinese **Colza Oil** (ex *Brassica Campestris v. Chinoleifera*), Black Mustard, White Mustard, **Rape Oil** and other varieties.—P.J. i./21,519.

Oleum Sinapis Volatile.

Average dose (U.S. X.).—$\frac{1}{8}$ minim (**0·008 Cc.**).

Consists principally of Allyl-iso-sulphocyanide. Fr. Cx. and P. Belg. IV. make the chemical synonymous with **Oleum Sinapis Aethereale.** Sp. Gr. 1·014 to 1·025. *B.P.* '14 requires a content of 92% of this substance. ***Soluble*** about 1 in 50 of water, readily in ether and alcohol. This solution is suitable as a rubefacient.

Percentage of volatile oil from Black Mustard seeds varies from 0·63 to 1·23, according to geographical source. English seeds yielded 1·07%.—Finnemore.

Volatile Oil of Black Mustard is a powerful antiseptic. It has been used as a preservative for wines, 1 in 100,000 stated to be effective without affecting their odour or flavour.—Finnemore. *Cochlearia Armoracia*, radish, turnip, watercress, contain mustard oils.—Wild, P.R.S.M., Ther. Sec.

Minimum fatal dose of **Allyl-iso-sulphocyanide** is stated to be $\frac{1}{5}$ minim per kilo. It cannot be recommended for internal use. Excessive inhalation of the essential oil into the nostrils is dangerous.

Allyl Sulphide, Allyl Isothiocyanate, Acetate and Allyl Alcohol investigated as to action on rabbits and pithed frogs—the Isothiocyanate is most powerful and the Acetate the least. They all affect the respiratory system and the circulation. A complete research into the physiological action of these bodies. —B.M.J. ii./11,609. *Vide* also Oleum Allii Essentiale.

Spiritus Sinapis, P.G. VI. Oil (volatile) 1 to Alcohol (90%) 49.

***Musterole** (T.M. 350827, 496249, 515576). A counter-irritant for rubbing into the skin as preventive against chills and for rheumatic pains.

Thiosinamin.—*Syn.* RHODALLIN, ALLYL-THIO-UREA, ALLYL-SULPHOCARBAMIDE. F.E. VIII. $SC.NH.C_3H_5NH_2 = 116{\cdot}1384$.

Dose.—Internally ½ gradually increased to 1½ grains (**0·03 to 0·1 Gm.**) (with caution—in capsule or alcoholic solution). Hypodermically 1½ to 3 grains as in the form of **Injectio Thiosinamin et Sodii Salicylatis vel et Antipyrin.**

(T.M.: Fibrolysin is no longer a Trade Mark. No. 271208 expired 1919, through non-payment of fees. Fibrolysan No. 319529/1909, is also wound up.)

Manufacture.—To essential oil of mustard 456 Gm. add in portions strong solution of ammonia 200 Gm. in Alcohol 200 Cc. The mixture becomes hot (or slight warming may be required to promote interaction)—cool down below 40° C. and shake until the odour of the mustard oil disappears. Evaporate at 40° C. to about 650 Gm. and leave to crystallise. Recrystallise from water. The crystals have melting point 74° C. Evaporate mother liquor and wash further crop of crystals with water and then with ether. Slight modifications of this process will be necessary as experience shows. *Start with good Mustard Oil.*

Soluble in water 1 in 18, alcohol about 1 in 2, and in ether.

Flavoring.—It is practically void of taste.

Uses.—To some extent internally, but chiefly by injection (*vide infra*) with Sodium Salicylate, for absorbing fibrous and scar tissue. Has been used for keloid and in scleroderma.

TINNITUS AURIUM has been treated by 5% aqueous solution hypodermically with improvement, dose being increased from 6 to 35 minims, also a 10% solution and a 20% Glycerin Solution. Should be tried before operating on the middle ear or labyrinth for this trouble.

PERICARDIAL ADHESIONS have been treated by 3 grain doses in 80 minims of water, every other day in the flanks, for 30 days.

SCAR KELOID resulting from a burn received 5 injections of Thiosinamin of 0·2 Gm. with each, 1 day's interval. Produced poisoning symptoms, sweating, headache (lasting 2 to 8 days). Ultimately the treatment was curative (after 18 injections).

Caution is needed whenever the patient experiences headache after the first injection of Thiosinamin. To our knowledge it may cause transient poisonous symptoms.

Injectio Thiosinamin et Sodii Salicylatis.

Dose.—1 to 2 Cc. every two or three days.

Sterules of this *Compound Thiosinamin Injection* prepared with a special solvent are made 1 and 2 Cc. for use either intramuscularly or hypodermically, are prepared. 1 Cc. contains approximately 0·06 Gm. (1 grain) of Thiosinamin and 0·09 Gm. (1½ grains) approx. of Sodium Salicylate.

Uses.—For relaxing scar tissue, in strictures of the gullet, urethra and rectum, in stenosis of the pylorus, rheumatoid arthritis, Dupuytren's contraction and eye affections (corneal infiltrations). Massage and stretching or the use of bougies in appropriate cases may be of value. Also in middle ear disease and for tinnitus (but the 'remote action' in such is doubtful) and in pleural adhesions injected locally, or into the gluteal muscles once or twice weekly according to severity of case. In lupus has been tried. It may be of value in arteriosclerosis, chronic rheumatism and paralysis.

Remarkable effect was obtained, we are informed, in treating a case of contracted tendons in a horse. The tendons were so badly contracted that the fetlock joint became permanently flexed and the front of the hoof rested on the ground. Action restored to normal a few weeks after injection.

Injectio Thiosinamin et Phenazoni.—*Martindale.* *Syn.* CICATRICINE.

Dose.—8 to 15 minims (**½ to 1 Cc.**). = 1½ grains to 3 grains (**0·1 to 0·2 Gm.**) Thiosinamin, 2½ to 5 grains (**0·16 to 0·3 Gm.**) Phenazone and 1/20 to 1/10 grain Eucaine Lactate.

It has been used in the treatment of cicatricial tissue. A useful injection, non-toxic and non-irritating.

Other substances have the power of providing concentrated aqueous solutions of Thiosinamin—Sodium Biborate, Urethane, Benzoates, Cinnamates, Glycocoll, etc.

Unguentum Thiosinamin.—*Martindale.*

Thiosinamin 1, Oleum Anseris Benzoatum to 10. In warm weather 5 or 10% of White Wax may be necessary.

Unguentum Thiosinamin et Antipyrin. — Thiosinamin 10%, Antipyrin 16·5%, in Oleum Anseris Benzoatum.

'Anserine' Mulls of Thiosinamin are prepared 10% strength.

Thiosinamin-ethyl-iodide. *Syn.* ✱TIODINE (T.M. 294293), THIODIN

$S = C(NH.C_3H_5)(NH_2C_2H_5I) = 272{\cdot}1104$.

Prepared by heating Thiosinamin and Ethyl Iodide under a reflux condenser. Forms white crystals melting at 68° C. ***Soluble*** readily in water and 1 in 1 in Alcohol (by our experiment).

Ampoules are prepared containing 3 grains (**0·2 Gm.**) of Tiodine.

Dose.—The contents of one ampoule every other day.

ACTINOMYCOSIS.—5 cases treated hypodermically with rapid and complete success.—T. G. Moorhead, B.M.J. i./29,419.

✱**Iodolysin** (T.M. 312678).—A similar preparation, stated to contain 43% Thiosinamin and 47% Iodine. **Iodolysin solution** for oral use, 30 minims containing 1 grain Thiosinamin and 1 grain Iodine, also **Injection** (hypodermic), 15 minims, containing 1½ grains of each. **Ointment** and **Pigment** (local) are prepared. To soften cicatrices and promote absorption of fibrous tissue.

RHEUMATOID ARTHRITIS improved by Iodolysin internally.—B.M.J. ii./23 1040.

Pills are made equivalent to 7½ grains of Potassium Iodide. In rheumatoid arthritis—2 to 6 pills daily after food. Well tolerated and less depressing than Potassium Iodide.—Sir T. Horder, Clin. Jl., July 11, '23,330.

Iodolysin Capsules contain 2 grains (**0·12 Gm.**). *Dose.*—1 thrice daily max. ***Urticaria*** may arise from internal use—often an idiosyncrasy. Local use in the case of a bruised semilunar cartilage of the knee, although successful caused absorption in the system, with swelling of the face and irritation eruption locally.—H. A. Spencer, Johannesburg, Oct., 1930.

Thiodotoxyl. A solution containing 10% each of Atoxyl and Thiosinamin-ethyl-iodide. Used in treatment of cancerous growths.

SODIUM.

Na=22·997.

A soft white metal, decomposing water. Is prevented from oxidisation by keeping under mineral oil.

Sodii Acetas. $CH_3COONa,3H_2O = 136{\cdot}0672$.

Average dose.—15 grains (U.S. X. 25 grains).

Colourless crystals or white powder. Soluble in water about 1 in 1 with alkaline reaction, and about 1 in 35 in alcohol 90%.

Uses.—To some extent as a diuretic. It is excreted as carbonate.

Flavoring.—Glyl Pini, Syl Lavandulæ; Syrupus Aurantii

Sodii Chloridum. NaCl=58·454. *Dose.*—10 to 60 grains (**0·6 to 4·0 Gm.**). White cubical crystals.

(**Natrium Chloratum** in German is Sodium Chloride. If the Germans wish to convey Sodium Chlorate they state **Natrium Chloricum**.)

Soluble 1 in $2\frac{3}{4}$ of water (not more in boiling water) in Alcohol 90% (about 1 in 200).

Flavoring—Syl Coriandri, Syl Menthæ Piperitæ.

Uses.—Although in common use is not requisite to those having ordinary mixed diet, but is necessary to vegetarians. Given in excess leads to scurvy, while insufficient salt leads to anæmia, debility and œdema of face and ankles. Large doses are emetic.

As a *purgative* may be given in dose of 120-240 grains. As a laxative, 75 grains in a tumbler of cold water, it is stated, acts efficiently and without pain. Rectal injections are used to kill threadworms. Hypodermically or into the veins as Normal Saline Solution, *q.v.*

Saline Solution, Normal. Physiological Salt Solution.

This should be isotonic with the liquid of the blood corpuscles and possess the same osmotic pressure as the liquor sanguinis. For man a solution of sodium chloride 0·9% (U.S. X. 0·85%), or approximately 80 grains to the pint of boiled water, freezing at closely—0·56° C., is generally used for intravenous injection in hæmorrhage, uterine flooding, or collapse. The injection should be made *at least* at 105° F. (*this is important*), into any convenient vein, the rate of injection varies; it may be as rapid as a pint in ten minutes, or as slow as 8 ounces per hour (see refs. *infra.*). Injections are also made into the rectum.

Soluté de Chlorure de Sodium Isotonique, Injectable. Fr. Cx. Supp. Nouv. (1926) is 0·8% sterilised at 120° C. for 15 minutes.

Fortunately ***only an approximation to an isotonic solution is necessary,*** as mucous membranes are practically insusceptible to changes in osmotic pressure within fairly wide limits. The solution should be slightly alkalised. 0·1% Sodium Bicarbonate is sufficient.—Marshall.

Isotonic Sodium Chloride for *Ophthalmic use* is 1·4%.

Rules for **Isotonic solutions.**—P.J. i./29,325.

The **Lacrymal Secretion** is stated to contain 1·3% Sodium Chloride and 0·5% Albumin. It has been suggested to make eye lotions isotonic.

Ringer's Solution. There were several formulæ. Mostly used now is Sodium Chloride 0·8, Potassium Chloride 0·0075, Calcium Chloride 0·01, Sodium Bicarbonate 0·01, Distilled Water to 100.

Sodium Chloride 0·88, Potassium Chloride 0·025, Calcium Chloride 0·02, Sodium Bicarbonate 0·015, Distilled Water to 100.—P.J.i./12,357. P. Jap. IV. adopts the first mentioned.

Ringer's original solution resembled frog's blood in its saline composition. Locke altered the composition of the salts contained, increasing the Sodium Chloride from 0·6 to 0·9% and adding Glucose. The cerebro-spinal fluid of man is virtually this modification.—W. D. Halliburton.

Locke's Solution contains Sodium Chloride 0·9, Potassium Chloride 0·042, Calcium Chloride 0·024, Sodium Bicarbonate 0·05, Dextrose 0·1%.

Ringer's Solution, as also **Locke's Solution, Sterules** are prepared for dilution: 1 produces 1 litre.

'Solubes' for producing 100 Cc. of Ringer's Solution are also made.

Fischer's Modified Ringer's Solution.

Sodium Chloride 0·5, Calcium Chloride 0·04, Potassium Chloride 0·02, Distilled Water to 100. This is employed in surgical practice instead of Normal Saline, *e.g.*, for dissolving Kerocain.

A Fluid having advantages over Ringer's or Tyrode's Solution This solution possesses constant *p*H value of 7·52 at 37°, is isotonic with blood, is sterilisable and contains calcium and potassium in a ratio approximating to that in arterial blood. Similar relation exists between total uni- and bivalent positive ions.

Stock Solution contains sodium chloride 10·5 Gm. potassium chloride 0·5 Gm., magnesium chloride 0·1 Gm., calcium chloride 0·3 Gm., n/1 phosphoric acid 5 Cc., and 50 Cc. of water.

For use filter 50 Cc. and add 1 litre of water, heat and when cool saturate with oxygen, and add 5 Cc. of sterile n/1 sodium carbonate solution.—J.C.S.A., 1922, i., 964.

Saline Solution Sterules contain in saturated solution sufficient for two pints.

'Solubes' Sodium Chloride, 20 grains each, are useful for producing extemporaneously 5 ounces of a normal saline solution.

Uses and References.—Largely employed in surgical shock by intravenous and rectal injection; also in post partum hæmorrhage. Particularly useful in the hæmorrhage of typhoid. Also aids recovery from poisoning by Carbolic Acid, Morphine and Alcohol. Vomiting, recurrent of infants (given per rectum or subcutaneously), cholera, pneumonia, uræmia, relapsing fever, delirium tremens, tetanus and diphtheria have been well treated by subcutaneous and intravenous use.

Eclampsia has been treated by intravenous injection in severe cases, but the treatment is condemned by others as being dangerous, especially where kidneys are involved.

Gonorrhœa.—1% Saline solution has many advantages over a 1 in 10,000 Potassium Permanganate solution for posterior irrigation.—B.M.J.E. ii./29,43.

Surgical Shock.—Saline Fluid injected to the extent of 300 Cc. per kilo causes embarrassment and failure of respiration. When the causes of shock are active an injection of fluid cannot force recovery.—J. D. Malcolm, M.P.C. May 17, '22,420.

Instead of Saline injections, Gum Saline-Bayliss (Sodium Chloride 2 Gm., Potassium Chloride 0·05 Gm., Calcium Chloride 0·05 Gm., Gum Acacia 5 Gm., Distilled Water 100 Cc.) is advocated for loss of blood if actual blood transfusion is impossible.—H. Pritchard, B.M.J. i./27,793. *See Acaciæ Gummi.*

In certain mental diseases in which there was a toxic element a litre of Ringer-Locke injected twice weekly.—J. P. Steel, B.M.J. ii./27,1177.

Plombière douches can be given at home—1½ to 2 pints **slowly**. Normal saline at 100° F. Two or three douches a week the maximum. Three weeks for a course. Use a rubber rectal tube, with end lubricated. Tube inserted 3 inches—generally 2 to 2½ inches (it depends—some say 6 inches), patient being on left side.—B.M.J. ii./25,545.

Rectal injections of Saline 2 pints to which Aspirin 15 grains and Brandy 1 ounce were added, following operation in consequence of traumatic rupture of the spleen.—W. H. Cam, B.M.J. i./16,200.

Hypertonic Saline Solution.—Sodium Chloride 5% in distilled water with ½% Sodium Citrate added (the proportion is sometimes varied up to 10% of salt and 1% Sodium Citrate).

Cholera.—Before giving hypertonic intravenous injections of saline precede with an alkaline injection of Sodium Bicarbonate 2 drachms, in water 1 pint.—L. M. Chattergee, T.D.B., Vol. 19, 1922,740.

In the collapse stage give intravenous injections of Hypertonic Saline solution, with **Calcium Permanganate** *per os*, ½ to 2 grains increased to 4 grains to the pint and in 2 grain pills every ¼ hour for first 3 hours and then hourly till stools become green. Give Sodium Bicarbonate intravenously up to 320 grains. Control temperature by cold sponging and iced water rectal injections. Prevent uræmia by increasing blood-pressure—Digitalin, Strophanthin, etc.—Sir L. Rogers, L. ii./15,219.

Hypertonic Saline intravenously no better than carminative 'Cholera Mixture' containing a little Opium.—J. W. Tomb and G. W. Thompson, Trans. Roy. Soc. Trop. Med., April, '27,516—521. Sir L. Rogers replies supporting his views on value of the injections.—*ibid.*, Nov., '27,200.

One of the effects of injecting Hypertonic Saline into the circulation is a diminution in the volume of the brain—hence of use in post-contusional or post-concussional states—for relief of headache—even 100 Cc. of 30% solution can be given, but usually 50 Cc. of 15% effective.—A. Feiling, B.M.J. ii./30,907.

TOXÆMIAS OF LATER PREGNANCY.—Hypertonic Saline—***harmful.***—V. J. Harding and H. B. Van Wyck, B.M.J. ii./30,589.

ACUTE INTESTINAL OBSTRUCTION well treated immediately after operation by 20 Gm. Sodium Chloride intravenously in 10% solution 30 Cc. at a time during 48 hours (maximum 70 Gm. for a man of average weight) with 1 litre physiological serum subcutaneously during the same period.—B.M.J.E. i./28,32.

Varicose veins have been treated by injection with strong Saline as sclerosing agent.

Large amounts—10 Cc. for one injection, up to 20 or 30 Cc. at one time; or with 5 or 10 Cc., 3 or 4 injections at one sitting. A more adherent and exclusive thrombosis and a better end-result than with other agents.—Gillespie and Strobel, B.M.J. ii./30,60.

Sodium Chloride 20% (as used by Linser of Tübingen and McPheeters of Minneapolis) the 'safest as far as systemic reaction is concerned.'—T. H. T. Barber, B.M.J. i./30,219. Retards clotting of the blood, and incapable of giving rise in the ordinary way to any thrombosis, either at time of injection or subsequently. Probably the most efficient and safest to use and will remain so until the ideal solution is discovered.—*ibid.*, B.M.J. ii./30,60.

4 to 10 Cc. of 20% solution gives good results, but is not certain in its effects and causes cramp-like pains.—A. H. Douthwaite, 'Injection Treatment of Varicose Veins' (H. K. Lewis), 5th Edn., 1929.

Salt Packs, *i.e.*, by packing wounds with Salt or Salt Tablets in gauze, were much used to wounds in war.

Antiseptic Power of Hypertonic Saline.

The inhibition of growth, *e.g.*, of *Staphylococcus pyogenes aureus* and *Bacillus Coli* by 5% hypertonic saline, experiments showed, is very slight. With 10 or 12% salt, there was no proliferation of the organisms in question.—L. Garrett Anderson and co-workers, L. i./16,1119.

Hypotonic Saline Solution St.G.H. is 0·3%.

Trunecek's Serum for nervous ailments and high arterial tension.

Dose.—Subcutaneously 1 Cc. to commence with, increasing by 0·2 Cc. May also be given by rectum and mouth.

Sodium Chloride 492, Sodium Sulphate 44, Sodium Phosphate 15, Sodium Carbonate 21, Potassium Sulphate 40, Water to 10,000.

Tablets of Trunecek's Serum are prepared 5 grains each, *i.e.*, equivalent approximately to 5 Cc. of the serum. *Daily dose* 3 to 6 with meals. Administration *per os* is equally effective.

For atheroma and sclerosis of arterial coats.

Trunecek's Serum has a freezing point—3·29° C. and an osmotic pressure 5·875 times greater than blood serum—*i.e.*, it is strongly hypertonic.

Cheron's Serum.—Sodium Chloride 2, Phenol 1, Sodium Phosphate (Na_2HPO_4, called Neutral Phosphate in France) 4, Sodium Sulphate 8, Distilled Water to 100.

Gelatin Saline and **Glucose Sterules** are described, pp. 424, 428.

Gum Acacia with Sodium Chloride for intravenous injection to replace blood lost by hæmorrhage, see p. 1.

Hayem's Solution. Sodium Chloride 5, Sodium Sulphate 10 Water 1,000. Sterilise. *Caution.*—This must be distinguished from Hayem's Blood Examination Fluid *which contains Sublimate*

Artificial Sea Water.—The following has been advised for injection as enema :—

Sodium Chloride 27, Magnesium Chloride 3, Potassium Chloride 1, Magnesium Sulphate 1¾, Calcium Sulphate 1, Distilled Water to 1,000.

Natural Sea Water has been injected hypodermically in eczema and digestive disorders : see Edn. XVIII, p. 745.

ARTHRITIS treated by injections of sea water, the dose varying from 10 to 500 Cc.—T. E. Lawson, Pr., Aug., '27,122.

Enema Sodii Chloridi, N.E.H.

Sodium Chloride ½ ounce, Warm Water 10 ounces. Use from 1 to 6 ounces for children according to age.

Dechlorination or Salt-free Diet.

NEPHRITIS has been treated by this (in many forms of nephritis the kidneys fail to eliminate salt). Copious diuresis sets in, œdema disappears and remains more or less absent so long as the treatment is kept up. Food should be cooked without it. The salt-free diet is, however, often disappointing. It should be tried where heart and lungs are hampered by excessive œdema and in migraine and chlorosis. The theory of salt retention does not, however, wholly explain œdema following gastro-enteritis in children nor all cases of œdema in Bright's disease.

EPILEPSY has been treated by Sodium Chloride reduction. Reduce the salt in the diet and the absorption of Bromide will increase. The combined treatment, *e.g.*, with Bromide Tablets containing 2 grains of Salt and 18 grains of Bromide to be used to salt broth, satisfactory.

Carbohydrates increase the retention of water while fats diminish thirst. If no salt be added to the food the body loses 15 to 25 Gm. of sodium chloride and 1½ to 2½ kilos of water ; a saltless diet is therefore itself diuretic. Generally speaking, the intake of water and salt increases the quantity of water taken up by the tissues and consequently may cause œdema.—P. E. Morhart, B.M.J.E. i./26,86.

See also **Table Salt containing 50% Potassium Chloride** under Potassium Chloride.

Sea Water.

According to Pasquier, Sea Water is a gentle purgative after being saturated with Carbon Dioxide, the dose being ½ to 1 pint.—C. D. i./30,88.

Sea Salt. *Syn.* **Bay Salt, Citean Salt.**

Obtained from Sea Water, which contains about 2·7%. In warm countries the water is allowed to evaporate in the air, and in cold countries it is allowed to freeze, when the ice is removed and the mother liquor then evaporated.—C. D. i./30,88.

Bromine Therapy is due to disturbance of the normal Chloride in the body by Bromine. If part of the normal Chloride is replaced by Bromide a smaller quantity of the latter is needed to produce an effect. A diet with low salt content is unpalatable. A double salt of **Glutaminic Acid** has been used and a modification containing 60% Bromine renders it possible to give Bromine and reduce salt intake. The preparation should be useful where the mineral salt and water balances are disturbed. Used in various œdemas where dehydration is required.—B.M.J.E. i./30,12.

Baths of Common Salt (or Tidman's Sea Salt), about 2 pounds to each bath, act as a tonic and stimulant, *e.g.*, in chronic rheumatism.

Sal Marinum Artificiale.—Potassium Iodide 1, Potassium Bromide Calcium Chloride 40, Magnesium Sulphate 200, Bay Salt 760.—Ph. Note

***Cerebos** (T.M. 227704) **Salt.**
Sodium Chloride with 4% of phosphates, mostly Calcium Phosphate, less deliquescent than 'Salt.' Is intended to replace the phosphates removed in the preparation of food.
Sodium Phosphate stated to be added to Table Salt to-day to prevent its going moist.—B.M.J. ii./27,28.
Digestive Salt. *Syn.* *PEPSALIA. (T.M. 90722.)
This consists of Sodium Chloride and Pepsin.

Pulvis Sodii Chloridi Compositus.
Sodium Chloride 6, Potassium Chlorate 1, Alum 1, Boric Acid 1, Borax 6. A saltspoonful in a half tumbler of warm water as a gargle is very beneficial for inflamed conditions of the throat.

Unguentum Sodii Chloridi. K.C.H., St. Bart.'s H. UNGUENTUM SALVAS R. V.I.
Sodium Chloride and Soft Paraffin, equal parts. R.N.H. has Sodium Chloride 1, Sodium Bicarbonate 1, Soft Paraffin to 4.
Ringworm (of hairy regions). Croton Oil treatment is painful. Use this Ointment instead. Rub in daily, after bathing the head with very hot water. Even more painful than Croton Oil.—A. Whitfield, L. i./23,1124.

Sodii Bromidum. NaBr = 102·913.
Dose.—5 to 30 grains (**0·3 to 2 Gm.**). Slipule No. 0 holds 10 grains.
Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.
In slightly deliquescent granular white crystals, tasting like common salt; soluble 8 in 9 of water.

(**Natrium Bromatum** P.G., FR. CX., P. HUNG., is Sodium Bromide. **Natrium Bromicum** abroad is Sodium Bromate $NaBrO_3$. Some countries, *e.g.*, Sweden and Holland, use **Brometum** to convey the Bromide.)
Flavoring.—Syl Menthæ Piperitæ, Glyl Coriandri; Syrupus Aromaticus (double dose), Syrupus Zingiberis.

Uses.—In insomnia, maniacal attacks and hysteria. Full doses combat morphine habit.
A mixture of bromides in the proportion of sodium bromide 2, potassium bromide 2, and ammonium bromide 1, is said to have a better action than one salt alone
It is used as substitute for the salt in the 'saltless' ('hypochloridization') treatment of epilepsy. (*See also* Sodium Phosphate·) The theory is that diminishing the chloride increases the readiness with which bromide enters the blood stream and nerve elements, *cf.* Dechlorination, p. 762.
The addition of 20 drops of Sal Volatile, or 5 drops of Fowler's Solution to the treatment prevents the rash which often disfigures patients taking Bromide.
DELIRIUM TREMENS in America treated by subdural injection of 1% Sodium Bromide Solution after removing 50 or 60 Cc. of cerebro-spinal fluid. Delirium controlled.—Boston Med. & Surg. Jl., Oct. 30, 1913; L. ii./13,1562.
TABES.—Intrathecal injection of Sodium Bromide recently tried. 1% solution used. In spastic patients, 1·6% (isotonic with body fluids.) 10 Cc. of cerebro-spinal fluid removed and the same quantity of solution introduced. —L.i./23,607.
Gall-bladder and ***gallstone pictures*** obtained in 60% of healthy persons and over 80% of those with diseased gall-bladders, following administration by the mouth of a single dose of 10 to 20 Gm. Sodium Bromide or Strontium Bromide dissolved in 100 or 150 Cc. of water. Rontgenograms taken at 5 to 12 hours afterwards. Patient should be on very light diet the preceding day.—Presse Med., Aug. 29, '25, per Jl. A.M.A. ii./25,1260. *See also ibid.* ii./25,74.

Urinary Radiology. Ammonium Bromide preferable to the Sodiu salt, a 25% aqueous or Glycerin solution being used.—B.M.J.E. ii./27,105.

Eczematous Processes. Sodium Bromide intravenously, 10 C of a 10% solution, said to be beneficial. Two to 5 injections usual sufficient, but up to 15 may be necessary. Chronic eczema showe least response.—Jl. Intrav. Therap., Jan. '26,20.

✱ **Sedobrol** (T.M. 347485) **Tablets** weigh 2 Gm., and contain 1·1 to 1·2 G of Sodium Bromide and 0·1 Gm. Sodium Chloride, in addition to vegeta extractives and fat. Suggested for salt-free Bromide Treatment or diet—t tablet being simply covered with 100 to 200 Cc. of hot water to produce bouillon for use in nervous affections, epilepsy and migraine.

Dose.—1 to 3 tablets *pro die.*

Sodii Bicarbonas. *Syn.* Sodii Carbonas Acidus, Sal de Vich F.E. VIII. $NaHCO_3$=84·0048.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Occurs in small white crystals or powder. ***Soluble*** 1 in 11 water; 20 parts are neutralised by 17 of Citric or 18 of Tartaric Acid Is largely employed in dyspepsia and is of value in diabetes. A litt rubbed on to the gum or placed in the cavity of a tooth, may sto toothache. Large doses very useful in infantile vomiting; t neutralise the acid intoxication in these cases 100 grains are give when attack threatens, or smaller doses, *e.g.*, 10–15 grains every hou on premonition or attack commencing. It is given in rheumati affections and in gastric ulcer and found of value in suppression c urine.

Incompatible with acids and acid salts, and with metallic an alkaloidal salts.

Bismuth, Magnesium and Lithium Benzoates and Salicylates are incom patible with Sodium Bicarbonate. It is also incompatible with Aspirin Acetates of Lead and Zinc liberate CO_2 from it.

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupu Aurantii, Elixir Simplex.

Sodium Bicarbonate Sterules, 3 Gm. in 45 Cc., are prepare for dilution as required. Sterilisation by heating at 100° C. in th Sterule converts approx. 5% of the Bicarbonate into Carbonate.

Diabetic coma treated by intravenous injection of 1 litre of 3 to 5% solutio slowly (in ¼ to ½ hour). **Isotonic Sodium Bicarbonate Solution** is 1·35 Gm with water *q.s.* to 100 Cc., or use 1·29%.—P.J. i./29,325.

In a normal person 2 drachms of Sodium Bicarbonate *per os* will usuall render the urine alkaline in 24 hours. In chronic nephritis the effect i produced by the same dose, but in pregnancy toxæmia a larger dose is required —L. i./13,1366.

Influenza.—Sodium Bicarbonate, 20 to 30 grains four times hourly, relieve abdominal pain and distension, and probably inhibits growth of the strepto coccus and neutralises its toxin, the organism being in the bowel.—H. C Butler, L. i./22,198.

Post-partum eclampsia treated by intravenous injections of 3% Sodium Bicarbonate Solution, 250 Cc. and 350 Cc. three hours later.—N. P. MacPhail U.F.C., '27,171. See also H. P. Wilson, Jl. A.M.A. i./27,380.

Pyrexia in infants of a few days or weeks old may often be due to pyelitis in which Sodium Bicarbonate with abundant water is of use.—L. ii./25,510.

Collutorium Alkalinum Compositum (was in **R.D.H.**)

Sodium Bicarbonate 15 grains, Sodium Chloride 10 grains, Sodium Salicylat 1 grain, Thymol, Menthol ¼ grain each, Glycerin of Borax 1 drachm, Thymo Solution to 1 ounce. One part to be used in 4 of water. For post-nasa catarrh.

Collunarium Alkalinum Compositus, R.O.H. NASAL DOUCHE.
Sodium Bicarbonate 2 grains, Borax 2 grains, Sodium Chloride 2 grains, Sugar 5 grains, Water to 1 ounce.

Nebula Alkalina, T.H.
Sodium Bicarbonate 15 grains, Borax 15 grains, Carbolic Acid 4 grains, Glycerin 45 minims, Water 1 ounce. **Dobell's Solution** is approx. half this strength. **Nebula Sodii Bicarbonatis.** Sodium Bicarbonate 20 grains, Glycerin 1 drachm, Water to 1 ounce.

Bain dit de Vichy. FR. CX.
Sodium Bicarbonate 500 Gm. dissolve in the bath at time of use.

Sodii Carbonas. $Na_2CO_3,10H_2O=286{\cdot}15$.
Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).
Manufacture.—From Sodium Chloride either by (the Solvay or Ammonia process) interaction with Ammonium Bicarbonate and subsequent ignition (Sodium Bicarbonate is an intermediate product), or by converting it into Sodium Sulphate and the action of heat on a mixture of the Sulphate with Carbon and Calcium Carbonate (Leblanc process).
Soluble in less than 2 of water and effloresces in the air.
Uses.—Internally in gout and skin diseases and for 'acidity.' A **lotion**, 2 grains to the ounce, relieves eczema. 1% is used as mouth wash or nasal douche. Instruments are boiled in a 1% solution to sterilise and to prevent rusting.
Exposure of sodium carbonate to moist air results in its gradual transformation to the hydrogen carbonate. (15—20% in 13 days.)—J.C.S.A. ii./21,639.
DIABETIC COMA.—The intravenous injection of 30 ounces of 3 to 4% solution affords best chance of restoring patient, but the Bicarbonate would seem preferable. A 5% solution has caused death.
RINGWORM.—Melt the end of a piece of ordinary washing soda the size of a walnut by holding against a red hot poker, and rub freely into the affected part (hair cut off if necessary). Practically painless and stated to be infallible. Apply Boric Ointment if necessary.—B.M.J. i./13,498.
Liquor Sodii Carbonatis R.O.H.
To Sterilise Instruments.—Sodium Carbonate 1 ounce, Sterile Water to 80 ounces. Boil Graefe Knives ½ minute, other instruments 3 minutes.

Sodii Carbonas Exsiccatus.
Approximately 107 of the exsiccated salt are obtained from 284 of the crystals. The salt is seldom used internally as such.

Sodii Carbonas Monohydratus. U.S. X. *Syn.* **Sodii Sesquicarbonas** $Na_2CO_3H_2O=124{\cdot}0096$, is known in commerce as **Concentrated 'Crystal Soda,'** and used as a Bath Salt—water softener. It occurs in small silky crystals.

Sodii Chloras, Sodium Chlorate. F.E. VIII. $NaClO_3=106{\cdot}454$.
Dose.—10 to 30 grains (**0·6 to 2 Gm.**).
Less toxic than Sodium Chloride. Average lethal dose in rats intraperitoneally 6 Gm. and 5 Gm. per kilo respectively.—J. L. Ulrich and V. A. Shternov, Jl. Ph. & Exp. Ther., Jan., '29,10.
Caution.—Not to be rubbed with combustible substances. Colourless crystals with saline taste, soluble 1 in less than 2 parts of water, and 1 in 34 of 90% alcohol.
Used in diphtheria, stomatitis, sore throat, and in urethritis.
Tablets of Sodium Chlorate and Borax, 5 grains. Useful in loss of voice and relaxed throat.

Gargarisma Chlori. *Syn.* EUCHLORINE GARGLE.

Mix in a pint bottle Sodium Chlorate in powder, 10 grains wit Hydrochloric Acid, 30 minims and let the gas generate and replac the air in the bottle, then cork the bottle, and let it stand for tw minutes ; lastly add gradually shaking after each addition, Distille Water to 1 pint. This is a good antiseptic, *cf. Vol. II.*

According to the hypothesis that $4NaClO_3$ ($= 4 \times 105{\cdot}71$) are decompose by 12 HCl ($= 12 \times 36{\cdot}5$) yielding 12 Cl ($= 12 \times 35{\cdot}5$) (in part ? as ClO_2 this gargle contains about 10 grains of Chlorine, in other words it is abo 0·125% Chlorine.

Useful to remove follicular patches, *e.g.*, in diphtheria 2 or ounces in a quart jug may be used as an inhalation (cold).

If salivation shows itself in Mercurial treatment of syphilis, Sodium Chlora or Potassium Chlorate mouth-wash or Sodium Chlorate internally 10 to 2 grains best.—W. Knowsley Sibley, Pres., Mar., '21,162.

Poisoning by Chlorine.—Treatment will be found unde Poisons at end of this volume.

Sodii Citras. $2C_3H_4(OH)(COONa)_3 + 11H_2O = 714{\cdot}2316$.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**). Granular crystals or powder

Intravenously, rabbits tolerate up to 0·4 to 1·6 Gm. per kilo suitably diluted, or approx. 6·4 to 25·6 Gm. per 10 stone man (o Meeh's Formula *q.v.*).

Solubility—1 in 3 of water. Is given as a cooling saline i preference to Potassium Citrate.

Sodium Citrate with $2H_2O$, in small crystals which are perfectly dry an remain stable, is now the article of commerce. This is official in the U.S. X 5 parts of this = 6 parts of the powder with $5\frac{1}{2}H_2O$ as above.—*See also* C. A Hill, P.J. i./23,153.

Flavoring.—Glyl Aurantii Amari or Syl Vanillæ.

Uses.—Sodium Citrate is oxidised into Carbonate in the syste and hence has alkaline effect. It has anticoagulent properties an is added for this reason to blood in transfusion.

Solutions of strength 3·8% are used for washing out syringes an apparatus in blood transfusion and a small quantity (about 10 o 15 Cc.) is mixed with the blood at the time it is drawn from th vein. See also refs. under *Blood Transfusion.*

Sodium Citrate Tablets.—5 and 10 grains.

These are used for infant feeding—(1) For weaning the healthy infant ; (2) for increasing the amount of milk taken in the 24 hours (3) for correcting milk dyspepsia (prevents formation of large clots) (4) for the avoidance of scurvy.

In the case of a child 4 months old commence with proportion o 1 grain to the ounce of milk, increase to 3 grains if necessary. Som add in addition double the amount of Sodium Bicarbonate.

The Citrate is thought to influence the clotting of milk by precipitating th bulk of the Lime Salts. Some claim, however, that the Citrate redissolve the precipitated Salts. **For Hospital Patients** prescribe 2 grains to each ounc of milk (first brought to the boil). If 4 ounces of milk are given every 3 hour *8 grains in 1 drachm of water* may be ordered (others advise 1 grain only t each ounce).

Bright's Disease.—Many patients do well on a pure milk diet (2½ to 3 pints slightly diluted) and Sodium Citrate added with advantage, but several difficulties arise in use of milk for nephritis.—Pr., Aug., '09,157.

Eczema and other 'lithæmic' conditions.—Large doses found valuable. Migraine and inveterate neuralgia in gouty adults have been treated.

Glaucoma treated by subconjunctival injection of solution 4·05 to 5·41% strength.—L. i./12,226.

Hæmorrhage in jaundice prevented by injection of 30 Cc. of 30% Aqueous Solution, 15 Cc. intramuscularly into each buttock.—M.P.C., Nov. 29, '22,446.

Intramuscular injection of Sodium Citrate causes prompt reduction of coagulation time of blood. A 30% solution used, 15 Cc. being injected into each buttock, preceded by injection of Novocain.—B.M.J.E. ii./24,50.

Intravenously prevents hæmorrhages at operations or delivery and from mucous membranes, *e.g.*, epistaxis or metrorrhagia. Rise of vascular tension avoided by the following solution: Sodium Citrate 20, Magnesium Chloride 10, Water 100; inject 15 to 40 Cc.—Per Jl. A.M.A. i./26,1170.

Malaria, amœbic hepatitis and relapsing fever treated with salts of organic acids, *e.g.*, citrates, tartrates or acetates. Suitable base, *e.g.*, Ammonium: stimulant, Sodium; non-toxic, to be taken into consideration. Their use advocated in practically all diseases due to protozoal parasites.—S. L. Rodrigues, M.P.C., Jan. 17, '23,50.

Pneumonia.—30 to 40 grains every two hours may cause rapid lysis.

Sea-sickness well treated by rectal injections of Sodium Citrate, 1 drachm to the pint, repeated according to retention and results. Also by the mouth from maximum dose of 1½ dr. every two or three hours, downwards.—B.M.J. i./25,140.

Thrombosis (threatened or present).—Citrates given with good results.—F. E. Tylecote, M.P., Mar. 27, '29,261.

Venous Thrombosis as occurring in enteric treated by intravenous injections (up to ½ pint) of 0·5% Sodium Citrate—good results.—H. F. Marris, B.M.J. ii./17,822.

Wright's Solution.—Sodium Chloride 4, Sodium Citrate 1, Water 120. For sinus washing.—Pye's Surg. Handicraft.

Ⓟ**Citronin.** *Dose.*—1 or 2 drachms at intervals of not less than 3 or 4 hours. A preparation containing in each drachm Sodium Citrate 2½ grains, Citric Acid ½ grain, Potassium Guaiacol Sulphonate 1 grain, Cascara Evacuant ¾ minim, Fluid Extract of Ipecacuanha 3/8 minim, Ethylmorphine Hydrochloride 1/32 grain. For treatment of bronchitis. It loosens the dry cough within a short time.

Liquor Sodii Ethylatis (*B.P.*, 1898).

Is prepared by dissolving Sodium 1, in Absolute Alcohol 20, keeping the latter cool by a stream of cold water; has Sp. Gr. 0·867, and contains 18% of C_2H_5ONa. Rapidly becomes brown.

Uses.—Effective caustic for nævi and moles and lupus; also in hypertrichosis. Applied with a glass rod for 2 or 3 successive days. No water should be allowed to touch the part.

Liquor Sodii Methylatis.

Is prepared on lines similar to the above, employing Methyl instead of Ethyl Alcohol. It is available containing 2, 5 and 10% of Sodium Methylate.

Sodii Ethylas in *dry* form is to be stored in sealed tubes.

Sodii Hydroxidum. Soda Caustica. NaOH=40·0048.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**) well diluted.

In coarse white powder, fused masses, or moulded sticks.

Sodii Iodidum. NaI=149·929.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

(**Natrium Jodatum,** P.G., Fr. Cx., is Sodium *Iodide.* Sodium *Iodate* called **Natrium Jodicum** in German. Some countries, *e.g.*, Sweden an Holland, use **Jodetium** to convey the Iodide.)

A white crystalline deliquescent powder, ***soluble*** 3 in 2 o water and 1 in 3 of alcohol 90%. Must be distinguished from th hydrous salt containing $2H_2O$, which crystallises from cold solutions

Flavoring.—Glyl Amygdalæ Amaræ, Syl Cinnamomi.

Uses similar to those of the potassium salt *q.v.*

Incompatible with Bismuth Salts, Ferric Salts, Strychnine, Spirit o Nitrous Ether (unless made alkaline) and with Quinine Sulphate.—*cf.* Potassiu Iodide.

Mediastinal Growths.—Sodium Iodide 2 or 3 grains with 5 to 7 grains c Chloral every 3, 4 or 6 hours relieves the dyspnœa. The Iodide may hav some effect in causing absorption—not of the tumour, but of the adventitiou materials about it, while the Chloral acts as sedative and antispasmodic.— Pr., May, 1911, p. 605.

Chronic Rheumatism.—Full doses of Sodium Iodide with Guaiacum giv good results.

Goitre is thought to be due to lack of iodine in food or water. A Rochester, New York, 20 parts of Iodine in the form of Sodium Iodide ha been added to every billion parts of tap water twice a year for two weeks i the hope of supplying to the human system and the thyroid gland the neede element to prevent goitre in young children. It has been suggested to us sea water in place of common salt. See also **Potassium Iodide.**

Intravenously.—Sodium Chloride and Sodium Iodide are practicall of similar toxicity, and are almost twice as toxic as Sodium Bromide.—D Loeser and A. L. Konwiser, Jl. Intrav. Therap., Jan., '26,7.

Asthma.—1 to 2 Gm. in 10 to 20 Cc. of water has been advocated intra venously.—B. R. Lœwy, Am. Jl. of Clin. Med., May, 1921.

Goitre well treated by six intravenous injections on alternate days o 6 grains in 5 Cc. water.—Reddi, Ind. M.G., Mar., '27; Pres., May, '28,159.

Herpes Zoster.—Intravenous injection of Sodium Iodide 20 Cc. 10% solution on the 1st, 2nd, 4th and 7th days (some patients less): also a dustin powder of Zinc Oxide, Camphor, Starch and Morphine. All cases cleared u in less than 17 days.—Pres., Oct., '31,352.

Syphilis of the Central Nervous System.—Injection of Sodium Iodid solution 10%, from 10 to 100 Cc., seemed to have beneficial effects. Th dissolving of Salvarsan substitutes in Sodium Iodide solution is suggested.— Jl. Ph. & Exp. Ther., June, '26,355.

Paresis.—*Usual* dose 1 Gm. in 10 Cc. water. Doses of 100 Cc. 10% generally well tolerated at 4 to 7-day intervals. Give preliminary test dos of 20 Cc. As much as 30 to 50 Gm. has been injected in one dose.—Jl. A.M.A ii./29,1753.

℞ **Mistura Sodii Iodidi Composita.**

Dose.—1 drachm (**4 Cc.**) thrice daily for an adult.

Sodium Iodide ½ drachm, Sodium Benzoate 3 drachms, Arsenical Solution ½ drachm, Tincture of Pulsatilla 1 drachm, Tincture of Baptisia 3 drachms, Syrup of Orange 1 ounce, Chloroform Water to 8 ounces.

In tuberculosis this mixture is of service. Calcium Salts in large quantities also essential

Sodium Iodide as Pyelographic Medium.

U.C.H. has a Solution of Sodium Iodide 15 Gm. in distilled water to 50 Cc.

Pyelography.—13·5% Sodium Iodide (Cameron) is best. Renal function and pyelography are mutually interdependent.—L. i./29,1160.

Prolonged anuria in a woman following injection of Sodium Iodide 15% to pelvis for pyelography. Relieved by venesection.—D. D. Pinnock and W. Matthews.—L. ii./31,529.

Sodium Iodo-methane Sulphonate. *Syn.* ✱ABRODIL (T.M. 357434). $I.CH_2.SO_3Na = 244{\cdot}0046$.

A white crystalline powder containing 52% Iodine firmly held. It does not react with Nitric Acid or Silver Nitrate. Soluble in water, 7 in 10. Solutions may be sterilised. A 4% solution is isotonic with the blood.

On intravenous injection 47% is excreted after 1 hour, 76% after 3 hours, 89% at 9 hours, and 93% after 24 hours, *i.e.*, 3 hours after injection the bulk of it has left the body.

A dose of 20 Gm. in 100 Cc. given intravenously at body temperature in two to three minutes gives opacity sufficient for pyelography. Skiagram is taken within 5 minutes. Adequate opacity persists for some 2½ hours. The bowel should be empty and gas-free. Retrograde pyelography may also be carried out, 20 Cc. of 20% solution being instilled by aid of ureteral catheters. Solutions are compatible with Mercury Oxycyanide which may be used as antiseptic.—L. i./31,950.

Sodii Nitras. $NaNO_2 = 85{\cdot}005$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

Has saline, refrigerant and diuretic properties.

Sodii Nitris, $NaNO_2 = 69{\cdot}005$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

Is obtained by reduction of Sodium Nitrate by fusing it with lead.

In white, deliquescent, crystalline granules, or in sticks, with a cooling saline taste, soluble 2 in 3 of water ; useful in angina pectoris and in epileptiform convulsions,—action similar to amyl nitrite.

Pharmacology.

Minimal effective intravenous dose in rabbits 1·5 mgr. per kilo.—H. B. Myers and V. T. Austin, Jl. Ph. & Exp. Ther., June, '29,227. Lethal dose 80 to 90 mgr. per kilo. Asphyxia the major cause of death.—T. V. Oltman and L. A. Crandall, Jl. Pharm. & Exp. Therap., Jan., '31,126.

Compressed Tablets contain 2½ grains each.

For asthma 3 to 5 grains frequently repeated ; specially useful with hyoscyamus.

Hypodermic Sterules, 1 Cc. contain ⅙ grain (**0·01 Gm.**), ⅓ grain (**0·02 Gm.**), and ¾ grain (**0·05 Gm.**).

Even ⅛ grain distinctly affects the circulation, yet large doses do not cause death.—D. J. Leach.

The modern treatment of high tension by nitrites had been recommended in the time of Queen Elizabeth—nitre and blood-letting were advocated to prolong life—the nitre contained nitrites.

In granular kidney valuable. High tension of the pulse is natural to the disease.

Raised arterial tension when dangerous is well treated by ½ grain doses, gradually increased to 4 or 5 grains.

See also **Pulvis Potassii Nitritis Compositus** and **Pulvis Sodii Nitritis Compositus.**

Tablets of Sodium Nitrite ½ grain, with **Sodium Iodide** 3 grains, also prepared 1 grain with 5 grains. To ward off attacks of asthma, 1 every 2 or 3 hours. In attacks of paroxysmal pain, in aortic insufficiency, Sodium Nitrite 2 grains with Sodium Iodide 3 grains thrice daily afford great temporary relief.—Yeo.

Tabellæ Sodii Nitritis Compositæ (*G. Oliver*).

Dose.—One or more as required.

Sodium Nitrite ½ grain, Erythrol Nitrate ⅛ grain, Mannitol Nitrate ¼ grain, Ammonium Hippurate 1 grain.

A combination of the slowly acting vasodilators, of some promise.—G. Oliver, Studies in Blood-Pressure.

Poisoning of an infant by taking 3½ grains Sodium Nitrite misread f Sodium Citrate.—L. ii./17,162.

SEA-SICKNESS. Claims for, not established. Not comparable with thr injections of Strychnine 1/32 grain and Atropine 1/100 grain hypodermical every 6 hours.—A. Vavasour Elder, M.P.C., Oct. 10, '28,305.

Sodii Phosphis.—$Na_2HPO_3+5H_2O=216{\cdot}1$, white crystallin powder soluble in water.

Sodii Phosphas Neutralis. *Syn.* TRIBASIC SODIUM PHOSPHAT $Na_3PO_4+12H_2O=380{\cdot}1982$.

Used for softening water and for boilers, preventing incrustation Soluble in water with alkaline reaction, dissociation giving Sodiu Hydrate.

Sodii Phosphas (*B.P.* '14). P. Ital. V., F.E. VIII. *Syn.* HYDROGE DI-SODIC PHOSPHATE; TASTELESS PURGING SALT. Na_2HPO $12H_2O=358{\cdot}209$. Ph. Ned. V. and P. Belg. IV. have $2H_2O$.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ ounce (**8 to 15 Gm.**) or 30 to 120 grains (**2 to 8 Gm** repeated. Colourless crystals or white granules.

Soluble 1 in 7 of water, is very efflorescent, loses 63% of i weight when heated to dull redness. Has an alkaline reaction.

Flavoring.—It is practically tasteless.

A mild aperient, well suited for a delicate stomach; small dos antacid and diuretic, useful in bilious sick-headache and jaundic

For hepatic calculi, 60 grains 3 times a day, with $\frac{1}{20}$ grain sodiu arsenate added, is given if any evidences of gastric intestinal catarr

Fireproofing.—Fairly concentrated solutions of sodium phosphat ammonium phosphate, sal ammoniac, or sodium tungstate (20%) are useful.

Dry Powder Fire Extinguisher.

Sodium Chloride 15, Ammonium Chloride 15, Sodium Bicarbonate 2 Mix and pack in thin glass vessels readily broken on throwing into fire.— P.J. ii./25,393.

* **Nuf** (T.M. 470152, Class 47). A white powder recommended for cleani purposes was found to consist of Sodium Phosphate in a partly effloresc state. Stated to be a natural product.

Sodii Phosphas Effervescens (**Martindale**).

Dose.—1 to 3 drachms (**4 to 12 Gm.**).

A convenient and pleasant mode of taking this useful purgativ Introduced by W. Martindale, and subsequently included in *B.P.* '9

In exophthalmic goitre and neurasthenia of value.

As nervine tonic in stomach dilatation—must be persevered wit

'Vescettes' of Sodium Phosphate. 30 grains.

Dose.—1 to 6 crushed and taken in a draught of warm water.

Sodii Phosphas Exsiccatus. $Na_2HPO_4=142{\cdot}0218$.

Dose.—10 grains to 2 drachms in some warm liquid.

* **Alka-Zane** (T.M. 485303).

Dose.—1 teaspoonful in a glass of cold water 3 or 4 times daily after mea An Alkaline Phosphate preparation. An antacid-diuretic, promoting elim nation of acid products of metabolism and maintaining 'alkali reserve.'

Sodii et Ammonii Phosphas. *Syn.* MICROCOSMIC SALT.

$Na(NH_4)\ HPO_4+4H_2O = 209{\cdot}1264$. Used in chemical analys with the blowpipe and for estimation of Magnesium.

Sodii Phosphas Acidus (*B.P.* '14). **Dihydrogen Sodium Phosphate** $NaH_2PO_4+H_2O=138{\cdot}0482$.

Dose.—30 to 60 grains (**2 to 4 Gm.**).

Crystals soluble about 1 in 1 of water, and 1 in 300 of alcohol 90%. The *B.P.* '14 Salt is 70% pure. Is given in alkalinity of urine with good results. Particularly useful in cystitis, and after operations on the bladder to keep the urine acid. If diarrhœa occurs, stop its use for a time.

Passage of a calcium oxalate stone may be assisted by employing this salt owing to its solvent action on calcium oxalate. The salt given by the mouth iseliminated as such. Two ounces per diem in 100 ounces of distilled water were administered, and in six weeks no symptoms of stone remained. The solvent action can be demonstrated *in vitro*. The treatment is advised in cases of Calcium Oxalate deposit without stone formation.

Mistura Sodii Acid-Phosphatis L.H.

Dose.—½ ounce (15 Cc.).

Sodium Acid Phosphate 30 grains, Red Mixture ½ ounce (Mistura Rubra L. H. Fuchsin $\frac{1}{1000}$ grain, Water ½ ounce).

Mistura Sodii Acid-Phosphatis Composita L.H.

With each dose of the previous, patient to take Hexamine 5 grains.

Regarding the latest theories of Hexamine Administration see Hexamine.

Mistura Antiseptica. Liverpool Royal Infirmary Pharm. (1922).

Dose.—Half ounce, well diluted with water.

Sodium Acid Phosphate 20 grains, Hexamine 10 grains, Syrup 20 minims, Water to half ounce.

Sodii Sesquiphosphas. $Na_3H_3P_2O_8=262{\cdot}0544$.

Average dose.—30 grains (**2 Gm.**) *pro die* in divided doses.

This salt may be considered as a combination of equimolecular proportions of the Ortho-phosphates,—Na_2HPO_4 and NaH_2PO_4. It is virtually neutral to both blue and red litmus. It distinguishes itself as an Ortho-phosphate Compound by not coagulating Albumin, and by yielding a yellow precipitate with Silver Nitrate Solution. ***Soluble*** with ease in water

Joulie employs this salt where the 'Ratio of Phosphoric Acid' is deficient and the 'Ratio of Acidity' is normal. It is not at all objectionable to the taste. Hyper-acidity will rapidly yield to the ordinary Sodium Phosphate, *e.g.*, in the form of Effervescent Sodium Phosphate, *q.v.* *See also Vol. II.*

Sodii Pyrophosphas, $Na_2P_4O_7+10H_2O=462{\cdot}230$. P. Helv. IV., P. Ned. IV., U.S. VIII., F.E. VIII.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Is obtainable by heating the Orthophosphate, $Na_2HPO_4+H_2O$. White crystals readily soluble in water. Uses similar to those of the Phosphate.

Sodium Silicate *and* **Potassium Silicate.** *Syn.* **Soluble Glass, Water Glass,** *both of which are used for impregnating bandages; also* **Sodium Silicofluoride,** *Syn.* **Sodium Fluosilicate; Silicosis,** *and the subject of* **Glass,** *are now dealt with in Vol. II.*

Sodii Persulphas, Sodium Persulphate. $Na_2S_2O_8=238{\cdot}114$.

Dose.—1 to 3 grains in water before meals.

In small white granular crystals, soluble in water. In tuberculosis and chlorotic and neuropathic subjects stimulates appetite. Useful in hyper-acid dyspepsia at the onset, also in gastric cancer. A strong oxidising and bleaching agent.

Liberates about 13% active oxygen. If it is desired to avoid production free sulphuric acid, the persulphate may be mixed with 1¼ times its weight Sodium Carbonate. 3 to 10% solutions as gargle and dressing. Suitable f wounds requiring moist dressing and where disinfection necessary. For sm ulcers may be used as dusting powder, with equal quantity of powdered ta Odourless and non-toxic.

Tetanus treated by intravenous injection of fresh 5% Sodium Persulpha solution given—60 Cc. each day—preferably in 2 or more doses injected slowl the injection taking some 5 minutes. A reaction often appears—nausea an vomiting for ½ hour. Three cases with good effect.—L. i./18,188.

For Ammonium and Potassium Persulphates, see Vol. II.

Sodii Sulphas Acidus. $NaHSO_4+H_2O=138{\cdot}0804$. *Syn.* Sodium Bisulphate.

In crystals or in fused masses, is recommended to purify wate which may have typhoid contamination ; 15 grains to a pint of wate destroys *B. typhosus* after 15 minutes contact, as also *B. enteritidis Spirillum choloræ* and internal parasitic worms.

Nauheim Bath Salts are prepared with this Salt and Sodium Bicarbonate. The Nauheim Water contains in addition Sodium and Calcium Chlorides, *cf.* List of Mineral Waters.

Fused Sodium Bisulphate Tablets, 5 ounces and packets o Sodium Bicarbonate for making **Effervescing baths** were th subject of a patent now expired.

Effervescing baths are believed by many to have a more marked effect lowering blood pressure than ordinary water at similar temperature.

Sander Carbon Dioxide Baths, with an impermeable cover o air foam, are used as an equivalent of Nauheim and Royat treatmen in diseases of the heart and circulatory system.

Sodii Sulphas. Glauber's Salt. $Na_2SO_4.10H_2O=322{\cdot}21$.

Dose.—¼ to ½ ounce, or 30 to 120 grains repeated.

The form known as '**Feathery Crystals**' is handy for dispensing Soluble about 1 in 3 of water—also in Glycerin ; insoluble in Alcoho

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ.

Infantile diarrhœa.—Small doses have been advised—about 6 grai initially for a baby under 6 months in Dill Water. Children over 6 month can take 10 to 20 grains without producing aperient action.

Sodii Sulphas Exsiccatus. $Na_2SO_4.H_2O=160{\cdot}0696$.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

On drying, Sodium Sulphate Cryst. loses about half its weight.

Sodii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water, take half an hour before breakfast is an efficient evacuant.

Sodii Magnesii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water taken ha an hour before breakfast.

These aperients are palatable and convenient to use when travelling

'Vescettes' of Sodio-Magnesium Sulphate. Each equivalent t 60 grains of the above, to be dissolved in a little warm water.

Sodium and Magnesium Sulphates are useful in clearing out th intestinal tract and lower the blood-pressure (in arteriosclerosis).

Sodii-Magnesii Sulphas Effervescens cum Caffeina.—*Martindale.*

Dose.—One teaspoonful or more.

A useful " pick-me-up " and for headaches.

'Vescettes' of this preparation contain 60 grains.

Chloro-Sodio-Magnesian Aperient.—*Martindale.*

Dose.—A teaspoonful or more.

An efficient saline purge, useful in migraine and other forms of headache; also in constipation, and for assisting digestion and relieving depression by increasing the action of the liver, intestines, and kidneys, and promoting free excretion of waste products.

The activity and palatability of the last five preparations may be increased, especially in winter, if taken in *warm water*. The combination of the salts of sodium and magnesium makes a more active purgative, but the effervescent sodium sulphate alone is more pleasant.

Sal Carolinum Factitium, P.G. VI., Ph. Ned. V., P. Belg. IV. Artificial Carlsbad Salt. *Dose.*—20 to 60 grains (**1·3 to 4 Gm.**) in warm water. Mix Dried Sodium Sulphate 22, Potassium Sulphate 1, Sodium Chloride 9, Sodium Bicarbonate 18, all in fine powder. 6 Gm. per litre or 53 grains to 1 pint of water is similar to Carlsbad Water.

Marienbad Salt is similar. **Marienbad Salt Tablets** may be prepared containing 60 grains of the mixture.

Marienbad Antiobesity Tablets. *Dose.*—One or two at bedtime. Aloes ½ grain, Rhubarb 1 grain, Cascara Extract ½ grain, Marienbad Salt ½ grain, Fucus Extract 1/6th grain.—P. J. F.

Note.—T.M.s ✱ 'Marienbader' No. 154288 and 154289, also 'Marienbader Tabletten' No. 242596 are on the Register.

Sal Emsanum Facticium, Ph. Ned. V.

Sodium Sulphate Exsiccated 10, Potassium Sulphate 10, Sodium Chloride 265, Sodium Bicarbonate 715. **Sal Hunyadi Janos Facticium, Ph. Ned. IV.** Desiccate Magnesium Sulphate 950 to 500, add Sodium Chloride 50, Sodium Sulphate Exsiccated 450. ✱**Sal Hunyadi Janos** (T.M.'s. numerous).

Sal Vichy Facticium, (T.M.'s numerous). **Ph. Ned. V.** Sodium Phosphate (cryst.) 20, Potassium Sulphate 50, Sodium Chloride 80, Sodium Bicarbonate 850.

Sal Wildungense Factiicum, Ph. Ned. V. Potassium Sulphate 5, Calcium Carbonate 190, Magnesium Carbonate 190, Scdium Chloride 240, Sodium Bicarbonate 375. To make artificial Wildungen Water use 4·6 Gm. per litre.

Dose of each.—20 to 60 grains (**1·3 to 4 Gm**), increased as required.

Sodii Sulphis. $Na_2SO_3,7H_2O=252·1632$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless efflorescent crystals (keep in stoppered bottles).

Soluble in water 1 in 2, in Glycerin 1 in 25; slightly in Alcohol 90%. Incompatible with acids. Antiseptic.

In dilatation of the stomach the late Sir Wm. Broadbent recommended as antiseptic treatment Sodium Sulphite 5 to 10 grain doses, with Sodium Bicarbonate and Nux Vomica between meals.

As a lotion for skin affections and sores of the mouth, and internally for *sarcinæ* in the stomach.

Sodii Sulphis Exsiccatus contains about 90% $Na_2SO_3=126·054$.
Is used in photography. Being in dry powder is convenient for transit.

Sodii Sulphis Acidus. *Syn.* SODII BISULPHIS. $NaHSO_3$=104·064
Dose.—5 to 30 grains (**0·3 to 2 Gm.**).
White powder soluble 1 in 4 of water. Incompatible with acid Has antiseptic properties. In stomatitis and skin affections. Warts are stated to disappear by applying a solution.

Intravenously 2 Cc. of a 5% solution (max. dose) injected in diabetics caus rapid transient decrease of Ketone bodies in the blood and urine. It unit with Acetone to form an insoluble compound.—O. Pucoko, Jl. A.M. ii./29,1184. *We have no further knowledge of this injection.*

Sodii Metabisulphis. *Syn.* SODIUM PYROSULPHITE. Na_2SO_3S =190·114. Made by passing Sulphur Dioxide into a hot concentrated aqueous solution of Sodium Sulphite.
Suggested Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Sodium Metabisulphite 20 grains, Alcohol 90% 1 ounce, Peppermint Oil 5 minims, Glycerin 2 ounces. Has been used as an antisep throat pigment. It is said to be a specific to kill yeast fungus in t intestines. In photographic use is similar to the Potash Salt, *q.v.*

Sodii Sulphidum, $Na_2S,9H_2O$=240·1944. Yellowish deliquesce crystals soluble in water. Employed in skin affections and 25 to 40% Aqueous Solution as depilatory.

Balneum Sulphuris Alkalinum (see also p. 791).
Sodium Sulphide 2 ounces, Sodium Chloride 2 ounces, Sodiu Bicarbonate 1 ounce. To be added to 50 or 60 gallons of hot wat

Soda Tartarata. **Sodii et Potassii Tartras.** (*B.P.* '14). ROCHEL SALT, SEIGNETTE SALT. $(CHOH)_2.COONa.COOK+4H_2O$ 282·1826.
Dose.—120 to 240 grains (**8 to 15 Gm.**).
Colourless crystals. ***Soluble*** 1 in 1½ of water.
Also in Alcohol 20% (Wt.) at 25° C. 1 in 2·82, 50% 1 in 40·7, 70% 1 in 332 80% 1 in 1665.—Seidell.
Flavoring.—Syl. Lavandulæ, Syl. Rosæ; Syrupus Aurant

Pulvis Sodæ Tartaratæ Effervescens (*B.P.* '14). *Syn.* **Seidlitz Powd** Sodium Potassium Tartrate, in dry powder, 120 grains. Sodium Bicarbonate, in dry powder, 40 grains, in the blue paper. Tartaric Acid, in powder, 40 grains, in the white paper. *B.P.* '14 states approx. these figu in metric terms. '**EXTRA STRONG**' (3 drachms Rochelle Salt) and '**Dou Strength**' (4 drachms) are also supplied.
A Patent was obtained for Seidlitz in 1815 by T. F. Savory of Bond Stre London.
'**Alkaline**' **Seidlitz Powders** are made with additional 60 grains Sodium Bicarbonate.
Seidlitz Powder in Italy is composed of Magnesium Sulphate 15, Sodi Bicarbonate 2, Tartaric Acid 2.—Ph. Notes.

Pulvis Effervescens Compositus, U.S. X. is similar to Seidl Powder B.P.

Sodii Tartras (Neutrale). $(CHOH.COONa)_2 2H_2O$=230·0564.
Dose.—As aperient ½ to 1 ounce. Diuretic, 15 to 60 grains r peated. White crystalline powder comparatively tasteless. Solub in water 1 in 2. Relaxes the bowels and increases the flow of urin

Sodii Sulphocyanidum. *Syn.* Sodium Rhodanide, Sodium Thiocyanate. C : N.S.Na=81·065.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A crystalline colourless salt, soluble in water 1 in 0·3, and 1 in 0·6 of Alcohol 90%. It has a sedative action on the nervous system, is an analgesic and may be found useful in nervous affections, arterial sclerosis, and chronic nephritis.

Favourable effect on pains of tabetics and in angiospastic migraine has been reported.

Sodium, potassium and ammonium thiocyanates were tested on rabbits and other animals. No hydrocyanic acid was split off, and these salts did not act as poisons.—J.C.S.A. ii./12,668.

Arterial Hypertension.—Sodium Sulphocyanate remarkably effective in reducing. A teaspoonful of 8% solution (=5 grains) well diluted with water three times daily after meals.—J. B. Nichols, Am. Jl. Med. Sci., Nov., '25,735; per Pres., July, '26,278.

Other statements on the treatment have appeared :—

The *dose* usually recommended is 2½ grains twice or thrice daily after meals in an aromatic mixture. Up to 15 grains daily tolerated over a period of three weeks.

In hypertension, causes fall in systolic figure usually with no change in cardiac rate. Less effect in cases with kidney damage or arteriosclerosis. Has a sedative effect and is often mildly hypnotic.—A. G. Smith and R. D. Rudolf, Can. Med. Assn. Jl., Sept., '28, per B.M.J.E. ii./28,86.

Hypertension thought due to spasm of the arterioles rather than structural arterial changes. Start with 2 grains thrice daily, increasing after 7 to 10 days to 10 grains if necessary. Systolic and diastolic pressure reduced. Toxic effects in some cases.—J. F. Borg, B.M.J.E. ii./30,28.

Pressure can be lowered considerably without ill effects, except rarely dermatitis.—R. D. Rudolf, L. ii./31,935.

See also Potassium Sulphocyanide.

Sodii Taurocholas, $NaC_{26}H_{44}NSO_7$=537·4082.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**), in pill, keratin-coated to prevent solution until it reaches the bowels. A whitish powder, prepared from pig's bile, ***soluble*** about 2 in 1 of water. It has been recommended for gouty obesity and dyspepsia.

Sodii Glycocholas. $NaC_{26}H_{42}NO_6$=487·3326.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A similar salt, soluble 1 in 2 of water and 1 in 3 of alcohol 90%, which appears to be a useful cholagogue for congestion of the liver, gallstones, constipation and melancholia.

These salts produce slight fall of blood pressure, the taurocholate more than the glycocholate.

Bile salts are the only certain cholagogues.—Sir Humphrey Rolleston, L. i./25,1207.

Pediculosis.—Bile Salts assist oily emulsions to penetrate shell of louse's egg. Sodium Taurocholate 10 Gm., Oleum Eucalypti 50 Cc., Water to 1,000. Solve the Taurocholate in water, add the oil and shake well. This emulsion is well rubbed into the head to wet the hair completely. Wrap in cap or towel. Wash with soap and water next morning, and a fine tooth comb to be used daily for a fortnight.—B. A. Peters.

Gonorrhœa, Prophylactic.—Bile Salts prevent growth *in vitro* (Castellani). A solution of Sodium Taurocholate 2 to 4 Gm. in Glycerin 20 Gm. to be applied to the meatus and over the glans before coitus.—Pres., Feb., '21,77.

Infantile Marasmus treated by Bile Salts (increasing fat assimilation). Average dose ¼ grain of the mixed Sodium Glycocholate and Taurocholate for infants of three months.—E. F. Kerby, L. i./21,272.

Bile Salts have been used locally to the conjunctiva.

Bile Salts *per os* lower blood sugar in rabbits and dogs.—Prof. J. R. Macleod, L. ii./30,519.

Gall-stones obtained in the meat industry in S. America are sent to Japan for preparation of dyes.—B.M.J. ii./30,618.

Acute Ileus.

Human Bile used successfully in 9 out of 13 cases. Freshly secreted huma bile from a cholecystomy preferable, but can be kept in an ice-chest for week. Give 2 oz. of bile in 4 oz. Saline per rectum and repeat every 4 hou until definite improvement is seen and bowels have been opened, reverting bile if vomiting returns. Causes no discomfort and no difficulty in retentic Only Water, Orange Juice, and Glucose allowed until ileus is overcome. Bo Ox Bile and vomited human bile have also been used, but both cause acu pain and are not so effective as fresh human bile.—R. St. Leger Brockma L. ii./27,320.

Acute intestinal obstruction. The action of human bile often dramatic. L. i./29,442.

Cholalic Acid. *Syn.* ✱COLALIN. (T.M. 271422) CHOLIC ACI $C_{24}H_{40}O_5 = 408{\cdot}292$.

An active constituent of bile in amorphous yellowish powde ***Soluble*** in alkalis, particularly caustic potash, and in alcoh about 1 in 1; insoluble in acids, ether and water.

Colalin Tablets ($\frac{1}{8}$ and $\frac{1}{2}$ grain in each. *Dose.*—One three times dai before food) also contain a little magnesium carbonate.

Uses.—Stimulates the liver and increases flow of bile. Has slig depressant action on heart. Solubl in the alkaline juice of the sma intestine—not dissolved in the stomach. For biliousness, mela cholia, recurrent sick-headache and intestinal indigestion.

Should constipation occur due to the action the bile has on absor tion of fats, **Colalin Laxative** (Colalin combined with the principl of Cascara) may be given. **Tablets** contain $1\frac{1}{8}$ grain each. *Dose.*- One thrice daily.

✱**Decholin** (T.M. 489836). A powerful cholagogue, consists of Dehydr cholic Acid. Given intravenously or *per os* 2 tablets thrice daily. Power stimulant (warn patient) to bile excretion and probably also to the liver ce themselves.—T. C. Hunt, L. ii./30,1002.

✱**Opobyl** (T.M. 481135).

Contains hepatic and biliary extracts, Extracts of Boldo and Combretu Podophyllin and Euonymin. For hepatic and biliary insufficiency. ✱**Pa biline** (T.M. 397235) has similar composition and same uses.

Tablets B.S.C.

Contain Bile Acids, Pancreatic Extract, Duodenal Membrane, Ipecacuan and Emodin. For constipation, gall-stones, etc.

Desoxycholic Acid. $C_{24}H_{40}O_4 = 392{\cdot}312$.

Manufacture.—Obtained by reducing Cholic Acid (*Syn.* Cholalic Aci $C_{24}H_4O_5$ with Zinc and Acetic Acid.—Further data Edn. XIX, p. 783.

Sodium Desoxycholate.

Spray Solution.—Sodium Desoxycholate 4, Quinine Hydrochloride 0 Glycerin 25, Water to 100. For septic throats.

Tablets.—Contain Sodium Desoxycholate 1 grain, Quinine Ethyl C bonate 1/8th grain, Peppermint Oil 1/20th minim, Ammoniated Glycyrrhi 2 grains. Also made with Flavine 1 in 1,000. For infected throats.

Bile salts appear to possess a solvent action on pneumococci, also on amœ and spirochætes. Sodium Desoxycholate was found to be 10 times m powerful than Sodium Cholate or Sodium Taurocholate. The addition Quinine enhances the action.—F. M. Wells, B.M.J. ii./17,6.

SPHAGNUM.

Turf Moss or Bog Moss.

Botanical.—There are numerous varieties of Sphagnum indigenous to Great Britain. Large tracts of it are found in Scotland, the English lakes, Dartmoor, Ireland and N. Wales.

The large concave leaved plant is *Sphagnum Cymbifolium*. *S. Papillosum* is only distinguishable under the microscope from it. *S. Cuspidatum* has long tapering branches and narrow tapering leaves and grows *in* water. *S. Acutifolium* is small, usually in compact tufts with small leaves of various tints. The other common species are mostly intermediate. *S. Contortum* is like a small *Cymbifolium* with curved rather stiff branches, *S. Reflexum* with flat edged leaves and *S. Squarrosum* with leaves bent back.

The plant consists virtually of a large collection of delicate resilient capillary tubes or perforated cells having the effect of a very fine sponge. These cells readily take in water and hold it firmly—the water can be squeezed out without the cells collapsing—(this is the case even after the application of hydraulic pressure.—W. H. M.).

Uses.—For some years past the writer has advocated the use of dried sphagnum as *the* absorbent dressing *par excellence* for imbibing discharge of any description. It was no doubt used for centuries by soldiers to staunch wounds in war and was also brought into service by blast furnace workers as a protective against heat and as a dressing for burns. The plant in its dry condition will absorb upwards of 20 times its weight of water or discharge. For taking up urinary discharge in bladder, kidney and dropsical affections the material is pre-eminently suitable. The dressing is also useful as a bedding for insane persons.

When cotton wool is placed in contact with a liquid, the fluid seems at once to seize it, its bulk becomes *diminished*, and its surface wet, each fibre having become saturated with the moisture. Moss, on the other hand, seizes the liquid; its bulk becomes rapidly and enormously *increased*. The absorbed liquid does not lie on the surface or between the fibres, but is shut up within the capillary cells of the moss: thus, though it is full of liquid, *it does not feel wet*, and though it may be full of pus it appears clean.

One of the advantages of moss as an absorbent is that the discharge when absorbed by it *spreads—diffuses quickly in all directions* until the moss is all soaked, rendering it therefore more efficient as a dressing. Cotton wool has not this action—the absorption is relatively local—upwards from the discharging surface. Patients state that the dressing is cool while cotton dressings are not.

Moss dressings are cheap, deodorant and antiputrescent; hence they are invaluable as applications to foul ulcers or septic abscesses.

The dressing may be wrung out in antiseptic lotion equivalent to a 1% Lysol just prior to use, though a vast number of the moss dressings used in the war were not sterilised or treated with antiseptic in any way—and this in all probability without untoward infection of the wound.

Sublimated Moss (0·25% Mercuric Chloride) is also available. **Steam Sterilisation** is unsatisfactory.

The writer who started the industry in this country, has had considerable experience in the preparation of Moss Dressings both in the compressed form, and as muslin covered bags of convenient size for the use of the dresser.

'Cavendish' Moss Sheets are of size 24 by 15 inches by inch approximately in thickness; two of these approximate 1 in weight. They are handy for transit, a cwt. packing into a sm case. In use the sheet is lightly broken up and teased out by t nurse and placed between folds of butter muslin or gauze. desired, the entire dressing so made is rung out in antiseptic loti —in many cases it will be satisfactory to slip the compressed dressi under the bed sheet as it is.

Gauze Covered Moss in the same size and sheet is also prepar ready for use.

Moss (Loose) Dressings in muslin bags size 12 by 8 inches, 10 6 inches, and 7 by 5 inches.

Moss Pillows 18 by 18 inches are made.

Moss dressings are especially suitable for wounds suppurating freely. such wounds the best results will be obtained when the moss is applied da A thin layer of gauze is wrung out of a warm antiseptic lotion and laid on wound; over this, and overlapping it freely, are placed the damp bags moss as required. After each bag has been wrung out of the warm loti the contained moss must be lightly opened out with the fingers; this is d easily owing to the elasticity of the material. Lastly, the bags are h comfortably in position with a bandage. This treatment of the moss-bag recommended whether the dressings are in the loose or compressed form, a whether they have been sublimated or sterilised by steam.—C. W. Cathc

Sphagnum pads very useful, placed under wounds to collect excess irrigant antiseptic in the Carrel Dakin method.—B.M.J. ii./17,597.

Sanodora Moss Sheets are impregnated with various essent oils: Bergamot, Birch Tar, Camphor, Clove, Citronella, Eucalypt Citriodora, Lemongrass, Sassafras and Wintergreen. They a used for absorbing objectionable odours and perfuming the atm sphere in closets, cloak-rooms, kitchens, factories, warehouses, e They are of use as fly deterrents.

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* 'STERULES.'

(T.M. 260408, 469165).

'Sterules' contain solutions made with special care for hypoderm intramuscular and intravenous use; also for inhalation and ophth mic and ionic purposes.

Hypodermic, Intramuscular and Intravenous Sterules are fla shaped or with the two ends pointed.

Sterules for Inhalation are made of Amyl Nitrite, Aroma Ammonia, Chloroform, Ether, Ethyl Iodide and its combinatio and similar compounds. (*See individual headings.*)

Sterules of Dry Chemicals, *e.g.*, 'Mercurome,' and 'Tylcalsi for making solutions extemporaneously, are also convenient.

The **Ophthalmic Sterule** is inserted through an **Ejector,** and its 'breec end is snapped off at the file mark. It is drawn further through the eje held horizontally, and the other end is broken off at the file mark. T 'breech' end of the ejector is now covered with the index finger, and the s part is pressed with the thumb and second finger to release a small quant (sufficient for one application in eye work) of a *sterile* solution. The file ma are situated ¼ inch from the ends of the 'Sterule.'

For list of medicaments in 'Sterule' form, *see* Index.

℗STRAMONIUM.

Dried leaves *B.P.* '14, and dried ripe seeds, *B.P.* '98, of *Datura Stramonium* (*Solanaceæ*). *Syn.* Thorn Apple. U.S. X. requires not less than 0·25% stramonium alkaloids in the leaves when assayed as for belladonna.

F.E. VIII .standardised as latter. P. Belg. IV. and P. Ital. V. not standardised. Fr. Cx. has max. single dose, 4 grains, max. dose during 24 hours, 15 grains approximately.

Uses.—Its action is similar to belladonna, and it is employed for the same purposes. Is a usual ingredient in cigarettes and the fumigating powders employed in asthma. Tincture and Extract of Stramonium have been used in Parkinsonism.—*v. postea.*

The leaves and seeds contain **Daturine**, which is identical with Hyoscyamine (*q.v.*) together with Hyoscyamine and Hyoscine.

In Spanish the plant is *Yerba de huaco*, 'Plant of the Graves.' The thorn-apple is used in South America in form of a drink which gives hallucinations in the nature of communication with the spirits of ancestors.—P.J. ii./12,686.

Individual plants of *D. Stramonium* gave 0·47, 0·55, 0·52 and 0·46% Alkaloid and *D. Tatula*, 0·47, 0·63 and 0·65%, thus showing a marked variation.—Int. Cong., 1912.

Cultivation.—The whole plant can be harvested with or without the root without fear of the total alkaloid content falling below 0·25%.—G. B. Koch, Am. Jl. Ph., Jan., 1919, C. D., '19,303.

Datura Metel Seeds from India contained 0·23% of total alkaloid consisting of Hyoscyamine and Scopolamine in proportion 2 : 1 together with a little Atropine. The capsules contained 0·1% of total alkaloid consisting of Scopolamine only.—P.J. ii./12,579, *see* also P.J. ii./05,230,617.

From the seeds of *Datura fastuosa var. Flor. coerul. plen.* which plant is said by many authorities to be identical with *D. alba*, Schmidt obtained Scopolamine 0·216%, Hyoscyamine 0·034%, and traces of Atropine. The var. *D. fastuosa flor. alb. plen.* gave slightly less of the constituents.

D. Alba, which grows wild in the Phillipines, as a source of Atropine and Hyoscyamine.—P.J. ii./16,297.

The leaves of *D. fastuosa v. alba* and *D. metel* as also seeds of the former are *B.P.* '14. Tincture of Seeds 1 in 4, Alcohol 70%. *Dose.*—5 to 15 minims.

Stramonium seeds contain about 15—30% of a fixed drying oil. The seeds and leaves have about the same alkaloidal strength—average 0·22%.

A key for distinguishing various species of Datura.—H. A. Timmerman, P.J. i./27,574.

Honey collected by bees from *D. Stramonium* has been wrongly stated to be toxic. Observation showed that the flowers in question are not visited by bees. They are pollenated by night-flying insects with long proboscides.—H. Deane, P.J. ii./13,134.

Assay of Stramonium. Various methods criticised.—C. M. Caines, P.J. ii./30,90.

Datura ***poisoning*** is common in Cairo. Symptoms are those of Belladonna poisoning. Writer has never seen a fatal case, though many remained on verge of death for hours.—L. ii./21,1065.

℗ **Extractum Stramonii** (*B.P.*, 1898).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

An extract of the seeds in No. 40 powder prepared with Alcohol 70%. U.S. X. Extracts (Pilular and Powdered) are assayed to 1% alkaloids. The average yield of extract from the leaves is 20%.

In spasmodic asthma the extract is found better than the tincture. Sufficient should be given to be slightly toxic. Most patients show toxic effects on taking $\frac{3}{4}$ grain in 24 hours.

℗**Tinctura Stramonii** (*B.P.* '14).

Dose.—5 to 15 minims, 1 of leaves to 5 of 45% alcohol.

U.S. X. 1 in 10 of diluted alcohol standardised to 0·025% Alkaloids.

Parkinsonism has been treated by Stramonium in pills « cachets, in progressively increasing doses of 0·05 or 0·10 Gm. to lim of tolerance; given preferably during meals. To avoid habituatio administer for 20 days with intervals of 10 days.—B.M.J.E. i./26,5

Chronic encephalitic Parkinsonism. Results equal to those from Hycsci hypodermically are obtained by giving Stramonium Extract, U.S.P. *per os* dose of ***0·25 Gm. to 1 Gm. or more thrice daily,*** the average ***dos being 0·75 Gm.*** Similar results obtained from Ext. Stramon. Exsic B.P.C., Stramonium Leaves, and the Tincture *B.P.* '14. The leaves have di advantage of excessive bulk. Therapeutically it was found that 1/100 gra Hyoscine hypodermically = dried leaves 1 Gm. = Ext. Stramon. U.S. 0·25 Gr = Ext. Stramonii Exsicc. 0·25 Gm. = Tinct. Stramonii 3 drachms. N actual curative effect is possible. Palliative treatment essential. The val of Hyoscine in idiopathic paralysis agitans was shown by Erb in 1906: chron encephalitic Parkinsonism is similar clinically. *Per os* medication needed replace irksome routine of three hypodermic injections daily. 80 cases we on the Extract for 6 months. Many were in a satisfactory condition c 0·5 Gm. thrice daily. One or two were getting more than 1 Gm., the large dose being 1·375 Gm. thrice daily. It is evident that the doses of Tinctu hitherto used by others for the purpose were far too small.—C. Worste Drought and T. R. Hill, L. i./30,1225.

45 to 60 minims of B.P. Tincture thrice daily increases ability to perfor rapid movements. Mental condition improved. May be continued for lon period.—E. A. Carmichael, Qtrly. Jl. Med., '29, per Pres., June, '29,224.

Stramonium Leaf of value as a palliative, in daily doses as high as 15—3 grains, given in small doses every hour or two up to limit of tolerance. Whe good results are obtained decrease to 7½ grains daily, which can be tolerate for months. Occasional diarrhœa or mydriasis may occur, disappearing c discontinuance.—Shapiro (Illinois), per Pres., June, '29,224.

Tincture of Stramonium, U.S.P., 20 to 70 minims given 3 or 4 times dail *per os.* Toxic manifestation rare and evanescent.—A. L. Jacobson and J Epplen, Jl. A.M.A. ii./29,2027; B.M.J.E. i./30,38.

ASTHMA.—Tinct. Stramonii 15 to 20 minims thrice daily is a maximu dose. Tinct. Hyoscyamus 20 minims, combined with an intestinal antisepti is most potent in controlling the abnormal muscular activity, and arresting th mental symptoms in 'spastic' conditions of the colon, but will cause dryness the throat. ***Warning regarding large doses of Tinct Stramonii.***—T. Stacey Wilson, L. ii./30,107.

℗**Mistura Antispasmodica, N.H.W.** (not in E.G.A.). Tincture Stramonium, Tincture of Lobelia (Ethereal), Tincture of Opium, of eac 6 minims, Chloroform Water to ½ ounce. ℗**Mistura Asthmatica, N.H.W** (not in E.G.A.). Tincture of Stramonium, Tincture of Lobelia (Ethereal) each 10 minims, Ether 15 minims, Potassium Bromide 10 grains, Chloroform Water to ½ ounce.

℗**Mistura Potassii Iodidi cum Lobelia, E.G.A.**

Dose.—½ ounce (**15 Cc.**).

Potassium Iodide 5 grains, Ethereal Tincture of Lobelia 10 minims, Tinctur of Stramonium 10 minims, Spirit of Chloroform 10 minims, Water to ½ ounce

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STRONTIUM.

Sr = 87·63.

Strontium is a relatively innocuous alkaline earth-metal. Its salts are relatively slowly absorbed.

Investigations at the Johns Hopkins University have shown that Strontium can be deposited in the bones with a resultant decrease of Calcium content It is capable of transmission to the young from the mother and gives rise t

a form of "Strontium rickets," which is not combatable with Cod Liver Oil. It is well to bear in mind its possible abnormal physiological behaviour. The entire abandonment of Strontium in therapy is suggested.—Jl. A.M.A., June, 1923, per P.J. i./23,573.

Strontii Bromidum (*B.P.* '14). *Syn.* KORONIUM (CORONIUM) BROMIDE $SrBr_2+6H_2O=355{\cdot}5556$.

Dose.—5 to 30 grain (**0·3 to 2 Gm.**).

In deliquescent crystals, 97% pure with bitter saline taste, ***soluble*** in less than an equal quantity of water.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

Used in gastric affections, dyspepsia, and vomiting of nervous origin; also in epilepsy instead of the Potash salt.

This salt may decolorise Compound Tincture of Cardamoms in a mixture.—P.J. i./14,670,698.

Tablets contain each 5 grains (**0·3 Gm.**).

Effervescent Strontium Bromide. *Dose.*—1 drachm (=10 grains).

'Vescettes' of **Strontium Bromide** contain 10 grains.

Strontii Bromidum Exsiccatum.

Dose.—4 to 24 grains (**0·25 to 1·5 Gm.**).

On drying Strontium Bromide it loses most of its water of crystallisation, 4 parts are about = 5 of crystals.

Strontii Carbonas. $SrCO_3=147{\cdot}63$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Strontii Iodidum. $SrI_2+6H_2O=449{\cdot}5876$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

In white crystalline masses, freely soluble in water.

Exophthalmic goitre of children has been treated with this and the Bromide, also asthma, rheumatism, and chronic endocarditis.

Strontii Lactas. FR. CX. $(C_2H_4\ OH.COO)_2Sr+3H_2O=319{\cdot}7548$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A white crystalline powder, very soluble in water, of service in albuminuria and Bright's disease. May be combined with iron in the albuminuria of pregnancy.

To increase coagulability of the blood 15 to 30 grain doses useful.

Tetany can be prevented or relieved by the continuous oral administration of Strontium Lactate. It acts by decreasing the permeability of the gut to Calcium excretion and by reducing the excitability of the motor nerves.—Am. Jl. Physiol., '26,75,378, per B.C.A., '26,A.318.

Strontii Salicylas, U.S. X. $[C_6H_4.OH.COO]_2Sr+2H_2O=397{\cdot}7392$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white crystalline powder, slightly soluble in water and in alcohol.

Used for chronic gout, and a good intestinal antiseptic.

Intravenously, 10 Cc. of 5% solution, has proved useful in chronic affections of the joints. The lactate may be given orally, and, in severe pain, the bromide intravenously in place of the salicylate.—Per P.J. ii./26,287.

STROPHANTHUS.

B.P.'14, F.E. VIII, P. Ital. V., P. Belg. IV., U.S. X., P.G. VI.

B.P.'14 describes the seeds of *Strophanthus Kombé* (Oliver), (*Apocynaceæ*) freed from the awns, of a fawn colour, and covered with hairs.

U.S. X. and P. Ital. include *S. hispidus*, and F.E. VIII. and P. Belg.

include also *S. gratus*; the last mentioned officialises that variety under a separate heading. P.G. VI. mentions only *S. gratus*.

U.S. X. is standardised and gives an average dose of 1 grain.

P. Hung. gives max. single dose ¾ grain (**0·05 Gm.**); max. in 24 hours, **0·15 Gm.**

Commercial history of.—E. M. Holmes, P.J. i./06,312.

S. Kombé and *S. hispidus* give a green colour with Sulphuric Acid and *S. gratus* red.

℗ **Extractum Strophanthi** (*B.P.* '14).

Dose.—¼ to 1 grain (**0·016 to 0·065 Gm.**).

The seeds are first percolated with purified ether, and then with 90% alcohol; the alcoholic percolate concentrated and mixed with milk sugar, so that 2 parts of extract in powder = 1 part of seeds.

℗ **Tinctura Strophanthi** (*B.P.* '14).

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

Prescribing Note.—It was reported to us (1923) that a number of prescriptions containing *Tincture of Strophanthus* and Nux Vomica in mixture with Chloroform Water caused severe diarrhœa in nearly every case. There is a possibility of hydrolysis. The Tincture as 'Drops' would be preferable.

Strophanthus Seeds de-fatted with Ether in No. 30 powder 1, by percolation with Alcohol (70%) *q.s.* to 10. Is four times the strength of the *B.P.* '98 preparation. This conforms with F.I. U.S. X. is 1 in 10 with Alcohol (94.9% Vol.), assayed biologically. P. Ital. V., F.E. VIII and P. Belg. IV. also 1 in 10.

Fr. Cx. has F.I. strength with max. single dose 3 minims approx. Max. during 24 hours 12 minims approx.

Physiologically Standardised Tincture of Strophanthus.—Standards adopted vary with different makers. Some adopt M.L.D. 0·006 Cc. per 100 Gm. weight of frog. Strophanthus Tincture properly stored loses little in activity. See also Vol. II.

For a note on the Chemical Assay of the seeds, also for other methods of making tinctures, see Vol. II.

℗ **Tabellæ Strophanthi,** equal to 1 minim of Tincture (*B.P.* '14) combined with chocolate. *Dose.*—2 to 5. ℗ **Tablets,** Compressed, are also prepared equal to 2 and 5 minims of the Tincture.

ℙ1 **Strophanthin.**

ℙ1 *Strophanthin and all other poisonous constituents of Strophanthus.*

Dose.—$\frac{1}{300}$ to $\frac{1}{100}$ grain (**0·0002 to 0·0006 Gm.**) hypodermically. U.S. X. gives average daily dose, intravenously $\frac{1}{120}$ grain. It is irritating at the site of injection.

Dose by the mouth 1 to 4 mgr. and up to 4 mgr. a day; by intramuscular injection 1 to 3 mgr. a day and by intravenous injection ¼ to 1 mgr. and up to 2 mgr. a day has been recommended. Given by the mouth it is often ill tolerated and strychnine (1 to 3 mgr. in the day) is the best antidote. Signs of overdose: headache, sense of tightness in the chest and præcordia, marked slowing or bigeminy of pulse, marked rise in blood pressure, cardiac arhythmia; insomnia, and nausea are least seen with the intravenous use of the substance. Little success in heart affections obtained with the drug taken *per os*.

Contraindicated where there is a high blood pressure and marked arterio-sclerosis and to those with acute or chronic nephritis or granular kidney.

A white glucoside, or "mixture of glucosides from S. Kombé" (U.S.). Soluble in water and alcohol 90%, allied in its physiological action to digitalin.

It is customary to distinguish k-Strophanthin from *S. Kombé*, h-Strophanthin from *S. hispidus* and g-Strophanthin from *S. gratus*.

Uses.—As a cardiac tonic and diuretic. Resembles digitalis in

effects but acts far more promptly. It is stated that the Tincture acts in from ½ to 1 hour, while Digitalis Tincture takes from 24 to 48 hours. Occasionally of service where the latter has failed or is not tolerated. Especially valuable in mitral stenosis, but unsuitable in aortic disease; pulse improves in force and rhythm, dyspnœa and palpitation are lessened, appetite is increased, action of bowels and perspiration not affected—non-cumulative. Of value in renal insufficiency. It is a better diuretic than Digitalis because, while it accelerates the circulation, it does not readily constrict the arterioles.

In heart failure, *intravenous* injection of 8—12 minims of 1 in 1,000 strophanthin solution (½ to ¾ mgr. of the base) has been successful.

In urgent heart cases Strophanthin intravenously is of unmistakable value. —W. Gordon, B.M.J. i./21,13.

Strophanthus as diuretic *cf.* action of Digitalis, p. 386.

Caution.—To our knowledge, the drug occasionally acts in an unaccountable manner—loss of consciousness has followed an ordinary dose in a weakened patient.

Ⓟ **Tablets, Hypodermic,** contain **Strophanthin** $\frac{1}{500}$ grain.

Ⓟ **Granules de Strophanthine,** Fr. Cx., $\frac{1}{100}$ mgr. and are coloured pink.

Ⓟ **Poudre de Strophanthine au Centième.** Fr. Cx. *Max. single dose* ½ grain. Max. during 24 hours 1½ grains approximately.

Strophanthin Cryst. $C_{30}H_{46}O_{12}.9H_2O = 760{\cdot}4992$. P.G. VI. *Syn.* Ouabain, Ouabain Arnaud, Gratus Strophanthin.

Dose.—¼ to 1 mgr. (1/250 to 1/60 grain) by injection.

The crystallised active principle of *S. gratus* Seeds and *Acocanthera Ouabaia* Wood. A stable product having well defined toxicity. ***Uses*** in general as for Strophanthin above.

Strophanthin Sterules contain 1/400 grain, 1/250 grain, and 1/60 grain.

P1 STRYCHNINA (*B.P.* '14), Fr. Cx., F.E. VIII.

P1 *Preparations or Admixtures containing* 0·2% *or more.*

P1 *Applicable to Northern Ireland and Irish Free State also, and Salts of Strychnine.*

$C_{21}H_{22}N_2O_2 = 334{\cdot}1876$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx.—*Max. single dose* $\frac{1}{12}$ grain. Max. during 24 hours ¼ grain approx. The alkaloid obtained from Nux Vomica, St. Ignatius' beans (*q.v.*), and the seeds of other species of *Strychnos.* In characteristic colourless crystals (not coloured by strong nitric acid: absence of Brucine). Exceedingly poisonous. Its absorption in the rectum is even more rapid than in the stomach, small intestine, œsophagus or colon.

It is supplied pink to cover brown tint forming in hot climates.

Soluble.—In water, 1 in 2,800 (according to our expts., 1924), about 1 in 400 of alcohol 60%, 1 in 150 of alcohol 90%, 1 in 400 of absolute alcohol, 1 in 6 of chloroform, nearly insoluble in ether.

Antidotes.—Apomorphine Injection or Emetics followed by washing out the stomach with Potassium or Calcium Permanganate

solution 2 to 5 grains per pint, then give Potassium Bromide 4 drachm dose repeated in 2 drachm amounts every hour if necessary. Chloral in ½ to 1 drachm doses. ***Charcoal*** *ad lib* in water. Chloroform or Ether Anæsthesia. Amyl Nitrite and Paraldehyde. Art. resp.

Strychnine compares with Brucine in toxicity as 33 : 4.—Wright and Dixon.

Flavoring.—For Strychnine Salts and preparations containing Strychnine, Syl Aurantii Amari, Syl Menthæ Piperitæ (very full dose).

℗ **Pilula Strychninæ** contains $\frac{1}{25}$, $\frac{1}{30}$, $\frac{1}{40}$, $\frac{1}{50}$, $\frac{1}{60}$, $\frac{1}{80}$, and $\frac{1}{100}$ grain.

℗ **Ferri et Strychninæ Citras.**

Average Dose.—2 grains (**0·12 Gm.**) in solution.

In scales varying in colour from garnet red to yellowish brown, freely soluble in cold water. It contains 1% of Strychnine, and Ferric Citrate corresponding to not less than 16% Metallic Iron.

℗ **Ferri, Quininæ et Strychninæ Citras.**

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Similar to the former with about 15% of Quinine.

℗ **Strychninæ Arsenas.**

$C_{21}H_{22}N_2O_2.H_3AsO_4,\frac{1}{2}H_2O=485{\cdot}1488$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In small white acicular crystals containing 68·72% Strychnine, soluble 1 in 34 of water.

In phthisis by hypodermic injection of ½% mixture with liquid Paraffin. *Dose.*—4 to 15 minims daily.

In addition to this acid salt there is another of composition :—

$C_{21}H_{22}N_2O(H_3AsO_4)_2H_2O$. Soluble 1 in 16¾.—Dott, P.J. ii./11,173. It contains much less Strychnine (42·8%).

℗ **Strychnine Acetate** is soluble 1 in 44, the **Hydrobromide** 1 in 70, the **Hypophosphite** (one of the most soluble salts) 1 in 3·3.

Dose of each as for Hydrochloride.

℗ **Strychninæ Hydrochloridum.**

$C_{21}H_{22}N_2O_2,HCl,2H_2O=406{\cdot}6836$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Small trimetric prisms, soluble 1 in 35·5 of water (by our experiments) ; alcohol (90%) 1 in 73.

The formula according to D. B. Dott should be $4C_{21}H_{22}N_2O_2HCl.7H_2O$.—C.D., Jan. 1, '27.

A 1% (*w/v*) solution is strongly hypotonic; 0·079 Gm. Sodium Chloride or 0·442 Gm. Glucose to every 10 Cc. renders it isotonic.

A case recorded where life was in danger, had $\frac{1}{30}$ grain doses increased to $\frac{1}{6}$ grain *pro die* in a month. A Chinaman with beri-beri (paralysis of) had up to $\frac{1}{4}$ grain *t.i.d.* Recovery in both cases.

℗ **Liquor Strychninæ Hydrochloridi** (*B.P.* '14).

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**).

Strychnine Hydrochloride 1, Alcohol (90%) 25, Water to 100.

For **hypodermic injection.** *Dose.*—2 to 6 minims.

Incompatible with *Liquor Arsenicalis*, alkalis, ***e.g.***, Sodium Bicarbonate, Sal Volatile, Bromides and Iodides.

A small quantity of Glycerin added in place of equivalent of the spirit prevents crystallisation of the salt round the neck of the bottle.

It is safer to prescribe Tincture of Nux Vomica in preference to Solution of Strychnine Hydrochloride when there is danger of incompatibility.

Strychnine Hydriodide is liable to be precipitated by incompatibility between a salt of Strychnine and Potassium Iodide. The solubility of

Strychnine Hydriodide (1 in 45 at 25° C.) is decreased by presence of excess soluble Iodide.—Jl. Am. Ph. A., Aug., '31,763, per P.J. ii./31,265.

We found recently (Feb. 1932) that Strychnine Hydrochloride 1/25 grain with Potassium Iodide 5 grains in Water 2 drachms deposited in cold weather —and markedly in 1 drachm; also 1/50 grain with 5 grains threw out in 1 drachm but not in 2 drachms of water, 1/100 grain with 5 grains in 1 drachm (and 2 drachms) remained perfectly clear.

With regard to **Strychnine with Bromides,** correspondence between the late W. Martindale, Sir W. Gowers, F. A. Rogers and A. J. Townley, 32 years ago, is of interest. W. Martindale found no deposition of Strychnine in an acid mixture with Lithium Bromide. F. A. Rogers confirmed this. A. J. Townley, however, pointed out that Strychnine Hydrobromide is more prone to be precipitated from acid solution than the Hydrochloride, but this fact does not constitute any real danger, because dilution in a mixture is invariably more than sufficient to redissolve any Acid Hydrobromide precipitated.—P.J. ii./1900,389,449,465.

℗ **Injectio Strychninæ Hypodermica** (*B.P.* '14).

Dose.—Hypodermically 5 to 10 minims (**0·3 to 0·6 Cc.**). Dissolve Strychnine Hydrochloride 0·75 Gm. in recently boiled and cooled Distilled Water 100 Cc.

℗ **Mistura Strychninæ Phosphorica. R.N.H.**

Solution of Strychnine Hydrochloride 3 minims, Dilute Phosphoric Acid 10 minims, Syrup of Ginger 30 minims, Water to 1 ounce.

℗ **Strychninæ Nitras, U.S., P.G. VI., P. Belg. IV., P. Hung. P. Ital. V., F. E. VIII.** *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**) **P. Hung.** gives *max. single dose* $\frac{1}{6}$ grain (0·01 Gm.), max. in at day $\frac{1}{3}$ grain (0·02 Gm.). P.G. VI. gives half these amounts; F.E. VIII. $\frac{1}{60}$ and $\frac{1}{12}$ grain respectively.

$C_{21}H_{22}N_2O_2.HNO_3 = 397{\cdot}2034$.

Colourless needles, soluble 1 in 60 of water; in 45 at 25° C. U.S.

℗ **Tablets, Hypodermic,** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{40}$, $\frac{1}{20}$ grain.

℗ **Injectio Strychninæ, Arsenii Iodidi et Quininæ.** — Strychnine Nitrate 1 grain, Arsenious Iodide 2 grains, Quinine Lactate 1 drachm, Distilled Water to 3 ounces.

Dose.—Up to 1 drachm hypodermically for adults.

Specific to reduce temperature in influenza attacks and almost any grave affection. Also prophylactic, *e.g.* in malaria.

Tabellæ Nitroglycerini et Strychninæ, *v.* p. 572.

℗ **Strychninæ Periodidum.** $C_{21}H_{22}N_2O_2.2I = 588{\cdot}0516$.

Dose.—1/100 grain (**0·0006 Gm.**) carefully increased, if desired.

Obtained by combination of Strychnine and Iodine in a suitable solvent as a dark red powder, containing about 56% of Strychnine.

Solubility.—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water. It splits up with Physiological Acid, liberating 13·6% of alkaloid, and a further 10% to Physiological Alkali.

Uses.—This novel form of the well-known alkaloid may be worthy of trial.

Dispensing Note.—To be given in form of *Levigations* (*q.v.*) in 'slipule' (No. 5) or cachet.

℗ **Strychninæ Sulphas,** U.S. X. Fr. Cx., F.E. VIII., P. Ital. V.

$(C_{21}H_{22}N_2O_2)_2H_2SO_4 + 5H_2O = 856{\cdot}5288$.

Dose—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx. *Max. single dose* $\frac{1}{10}$ grain; max. during 24 hours $\frac{1}{4}$ grain approx. F.E. $\frac{1}{60}$ and $\frac{1}{12}$ grain respectively.

The neutral salt is in prismatic crystals, soluble 1 in 62 of water; M.pt. 200° C. It contains $5\frac{1}{2}H_2O$; *i.e.* there is usually a loss on drying of 11·44% approx.—Dott, P.J. i./12,425.

℞ **Hypodermic Injection** 1 in 100. *Dose.*—1 to 6 minims.
℞ **Tablets,** $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain each, for administration *per os.*
℞ **Hypodermic Tablets** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain.
℞ **Strychninæ Sulphas Acidus.** *Syn.* HULLE'S SOLUBLE STRYCHNINE. $C_{21}H_{22}N_2O_2.H_2SO_4+2H_2O=468{\cdot}2944$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In white silky acicular crystals with a slightly acid reaction, soluble 1 in 42 of water.

℞ **Strychninæ Valerianas.**

A non-crystallisable salt supplied in aqueous solution equivalent to 25% of the base. *Dose.*—$\frac{1}{25}$ minim to $\frac{1}{10}$ minim (=$\frac{1}{100}$ to $\frac{1}{40}$ grain of the base). A useful nervine tonic.

Uses of, and References to Strychnine Salts.

In cases of heart disease in which Digitalis is inadmissible, Nux Vomica and Strychnine are used as heart stimulants and for this purpose they are often combined with Caffeine. Patients almost dead from failure of the heart in the course of chronic cardiac disease may apparently be brought round by subcutaneous injection of Strychnine, but some doubt its efficacy.—Hale White.

Strychnine has powerful action on the vasomotor system, with the property of stimulating liberation of Adrenalin. It has no direct cardiac action of value, but acts through the Adrenalin.—O. S. Gibbs, B.M.J. i./31,582.

For old people, Strychnine and Nux Vomica have been described as the only useful bitter tonics.

CARDIOLOGY.—Strychnine has been unduly discredited.—W. Gordon, B.M.J. i./21,13.

PROGRESSIVE MUSCULAR ATROPHY.—To arrest, Strychnine hypodermically the only treatment. Acts more directly than by mouth.—Gowers, Disease of the Nervous System.

MYASTHENIA.—Strychnine hypodermically is frequently beneficial, but not curative.—L. i./10,355.

CHOREA MINOR, INCONTINENCE OF URINE, GASTRALGIA, DRINK CRAVING.—Strychnine is useful internally.

PUERPERAL SEPSIS.—In severe cases with failure of circulation often of great value hypodermically.—B.M.J. ii./09,1038.

SEA SICKNESS.—Strychnine Sulphate $\frac{1}{80}$ to $\frac{1}{30}$ grain with Atropine Sulphate $\frac{1}{150}$ grain, either hypodermically or by the mouth in preference (but then less efficient), and repeated in a few hours if necessary. Surface of body should be kept warm.—B.M.J. ii./10,1199.

GASTRIC ATONY.—To produce any beneficial effect very *small* doses of Strychnine must be used.—T. Izod Bennett, B.M.J. i./23,369.

Strychnine as diuretic, *cf.* action of Digitalis, p. 386.

Strychnine used in drug smoking in China. Mixed with Heroin, Cane Sugar, and Milk Sugar in pill form.—L. i./26,110.

Ⓟ SULPHONAL.

$(CH_3)_2.C.(SO_2.C_2H_5)_2=228{\cdot}2488$.

Sulphonmethanum, *B.P.*'14, U.S. X., FR. CX., P.G. VI., P. HUNG., P. BELG. IV., F.E. VIII. *Syn.* DIMETHYL-METHANE-DIETHYLSULPHONE.

Manufacturers and wholesale and retail vendors must label Poison and treat otherwise as Ⓟ.

Manufacture.—By oxidation of a compound of ethyl-mercaptan and acetone.—*See* N. Evers, Chemistry of Drugs, 1926.

In colourless crystals or powder, tasteless and odourless, ***soluble***

about 1 in 450 of water. In alcohol 1 in 80, freely in hot alcohol. Melts at 125·5° C.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). In cachets or suspended with mucilage. P.G. VI. and Fr. Cx. Supp. 1920 have *max. single dose* 1 Gm.; max. during 24 hours 2 Gm. (F.E. 1 and 3 Gm. respectively). Should be finely powdered and followed by a draught of hot fluid. Unless in solution, a dose should be given an hour before sleep is desired.

Antidotes.—See chapter on.

Uses.—Hypnotic, but is not curative of pain; does not affect digestion, pulse, or temperature, especially desirable for nervous subjects. Useful in chorea. Is slow in action on account of slight solubility; 30 grains may be given in solution in 1 ounce of brandy with 2 ounces of boiling water added (=about 140° F.).

For calming motor excitement of the Insane.— Fatal accidents seldom occur if given with care and patients watched. If given undissolved it may remain a long time in the alimentary canal. *As far as possible it should be given in solution.* To give 20 grains, ½ pint of a hot beverage at least is needed—milk or whisky. Watch carefully for renal irritation. It should not be given over a long period without a break nor to persons suffering from chronic constipation. Contraindicated in chronic alcoholism. —G. M. Roberston, Jl. Mental Sci., April, 1911.

Hæmatoporphyrinuria, followed by increasing weakness, flaccid paralysis and death, after lengthy treatment with Sulphonal (20 grains daily for three months).—Wilfred Harris, L. ii./22,854.

Enuresis well treated with small doses.—L. ii./17,728, *cf.* Therap. Index.

Ⓟ **Tablets, 5 grains (0·3 Gm.).** *Dose.*—1 to 6. Should be crushed and taken in warm water. Ⓟ **Capsules** contain 5 and 10 grains.

Ⓟ **Effervescent Sulphonal** contains 5 grains in 1 drachm.

Ⓟ **Haustus Sulphonal.** Sulphonal 20 grains to 1 ounce of **Mistura Mucilaginosa** (Mucilage of Gum Acacia 2 drachms, Syrup 30 minims, Water to 1 ounce.) (Was in G.H.)

'Reversed Sulphonal,' *i.e.*, Diethyl-methane-dimethyl-sulphone, is probably included as Ⓟ by the Order in Council. It is not a homologue of sulphonal but a metameride.—B.M.J. i./13,836.

Ⓟ **Methyl-Sulphonal** (*B.P.* '14). *Syn.* ✱**Trional** (T.M. 279228) —Fr. Cx. Diethyl-sulfone-methyl-ethyl-methane.

Ph. Ned. VI., P. Belg. IV., P. Helv., P.Jap., P. G. VI., F. E. VIII., Sulphon-ethyl-methanum, U.S.X.

T.M. No. 279228 is the signature of a firm. Patent 16333/1888 expired.

N.B.—Conditions of Sale as for Sulphonal q.v.

$CH_3.C_2H_5.C.(SO_2.C_2H_5)_2$=242·2604.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**), in cachets, in a large cup of hot liquid. Fr. Cx. Supp. 1920 gives latter approx. as max. single, and during 24 hours. P.G. VI. has max. during 24 hours 30 grains.

An oxidation product of mercaptol made by the condensation of methylethylketone with ethylmercaptan. In minute crystals, soluble 1 in 320 of water (we find in practice, 1 in 420), in alcohol 90% about 1 in 11, and in ether. M.pt. 76 to 76·5° C.

Uses.—Has hypnotic action between that of sulphonal and tetronal. Has cured chorea. Useful for the insane. Tetronal is

the better sedative, Trional is more effective in sleeplessness connected with neurasthenia and organic brain disease. Both are useless in insomnia due to pain, and in morphine and cocaine habits.

Ⓟ **Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

Recovery after effects of 125 grains.—L. i./03,1096. Poisonings by Trional successfully treated by Strychnine injections, Smelling Salts, and 1 drachm doses of Sulphate of Magnesium every four hours.—L. i./10,104.

Ⓟ **Haustus Trional,** 30 grains to Mucilage Mixture 1 ounce. (Was in G.H., *cf.* Haustus Sulphonal.)

Applying Hans Meyer's Theory *q.v.* (Therapeutic Index—Insomnia), to these methane derivatives of the Sulphones, the coefficient of Trional is 4·46, Tetronal 4·04, Sulphonal only 1·59, which is in practice about their activity. *Trional best of the three, Sulphonal should be dropped, Tetronal too dangerous.*—B.M.J. i./09,554.

SULPHUR.

S=32·06

Production of Flowers of Sulphur and Roll Sulphur at Rotherhithe. 'Ground' Sulphur is made by grinding Sulphur as imported. The latter is not B.P.—Prof. H. G. Greenish, P.J. i./26,541.

Dose.—20 to 60 grains (**1·2 to 4 Gm.**) in milk or treacle, with confection of senna, or as Pulvis Glycyrrhizæ Compositus. Sublimed sulphur in fine powder, for use either internally or externally, is preferred to Precipitated.

Soluble.—Freely in Carbon Bisulphide and Benzyl Chloride; in Petrol, Benzol and Toluol approx. 1 in 4; in Chloroform 1·33% *w/v*, in Almond Oil 0·8%, Olive Oil 0·5%, Cotton Seed Oil 0·5%, and in Sesame Oil 1·3% *w/v* (by our experiments, 1931). No crystallisation takes place after 24 hours' standing at the above concentration limits at summer temperature, but would probably crystallise in winter.

Uses.—*Internally* it has no action on the stomach but a certain proportion administered is converted into alkali sulphides in the intestines with consequent mild laxative effect. Given internally it has been employed for skin affections, occasionally benefiting chronic eczema with much itching. Hale White says its powers in bronchitis and rheumatic affections are doubtful. *Externally* sulphur is commonly used to cure scabies and for acne.

Sweating of the feet has been treated by drachm doses thrice daily.

In diphtheria Sulphur as an insufflation caused death in a child of 9. The practice (dangerous), it appears, is common in South Wales.—L. ii./16,29.

As an antiseptic, Sulphur suspended in glycerin has been injected into suppurating sinuses.

Sulphur Lotum, U.S. is washed with ammoniated water.

'Colloid' Sulphur prepared by precipitating sulphur from polysulphides with an acid in the presence of albumin, is said to be a better antiseptic than ordinary precipitated sulphur.—*cf.* p. 371.

SKIN AFFECTIONS.—The skin has been painted with a solution of Sulphurate Potash 1 in 2, twice. The part is then subjected to Acetic Acid Vapour or dabbed with 5 to 10% Acetic Acid. Sulphur is adherent as a thick coating.—B.M.J.E. i./13,96.

SEBORRHŒIC ALOPECIA treated by saturated solution of Sulphur in Carbon Disulphide.—Sabouraud, B.M.J. ii./25,984.

RINGWORM OF THE GROIN (singularly intractable) treated by means of Nascent Sulphur, formed by applying a 6% Hyposulphite of Sodium Solution on lint covered with oil silk for about 10 minutes, followed by painting with 3% Tartaric Acid Solution.—J. M. H. MacLeod, Pr., Dec., '12,827.

Chronic rheumatism treated by intramuscular injection. —Sulphur in Poppy Seed Oil injected in 6 minim doses deeply into trunk muscles or thigh. Injection repeated after three days and dose rapidly increased in the following injections to 30—45 minims. Total of 10 injections and repeat after 3 months. Alarming reactions—increase of pain, fever and vomiting, but night pains lost and motility increased. Should not be used in feeble patients and where pain is not marked unless increased motility is greatly desired. **Sterules** containing **0·001 Gm.** of Sulphur in **1 Cc.** Poppy Seed Oil have been used.

A **Sulphur Paste** (5%) has been tried.—A. T. Todd, B.M.J. i./27,1050.

Oleum Sulphuris. *Syn.* SULFOSIN.

Dose.—0·5 increased to 10 Cc. intramuscularly—supraperiosteally on the lateral surface of the femur.

A 1% solution, or suspension (soluble on warming), of Sulphur in Olive Oil. The injections set up a febrile condition of short duration. The aim is to reach 104° F. gradually. Repeated injections may have therapeutic effect in general paralysis, neurosyphilis, and other syphilitic—and certain non-syphilitic—lesions of the central nervous system. Better than malaria infection treatment.—K. Schroeder, L. ii./29,1081 ; ii./30,549.

High fever produced. Treatment of G.P.I. worth trial.—N. G. Harris, L. i./30,1069. Good pyrexial reactions.—W. H. Shilvock, L. ii./30,347.

Consecutive temperatures of 104 or 105° F., as in induced malaria, *not* obtained with Sulfosin.—W. G. Patterson and S. R. L. Switzer, L. ii./30,348. Painful and useless. A number of other methods—' experiments '—ineffective, in Vienna.—L. i./30,375.

High temperature within 24 hours. Produces considerable leucocytosis.—T. D. Power, L. ii./30,1289.

Suitable for advanced cases of G.P.I., because harmless, especially on a degenerate myocardium. Results compare favourably with malarial pyrexia. —J. H. R. Laptain, L. i./31,635.

DEMENTIA PRÆCOX treated, starting with 1 Cc. and increasing by 1 Cc. up to 12 injections. Sweating, loss of appetite, leucocytosis, and rise of temperature. Progressive dementia may be prevented.—P. C. Collingwood Fenwick, L. i./31,241.

PERSISTENT PSYCHOSIS.—The pyrexia and leucocytosis caused is of limited value.—D. Macmillan and A. McNae Wyllie, L. i./31,909.

Sulphur Sterules, 1% solution in oil, 1 to 10 Cc., are made.

Confectio Guaiaci Composita, L.H. **' Chelsea Pensioner.'**

Dose.—1 drachm (**4 Gm.**).

Guaiacum Resin in powder 2, Sublimed Sulphur 4, Mustard 4, Potassium Nitrate 1, Rhubarb Root 1, Treacle to 64.

Acid Potassium Tartrate is added to some formulæ.

St. M.'s H. has Guaiacum Resin 10, Magnesium Carbonate 10, Sublimed Sulphur 15, Treacle 60. This is a more usual formula.

Confectio Sulphuris (*B.P.* '14).

Contains 45% Precipitated Sulphur with 11% Acid Potassium Tartrate. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

Confectio Sennæ et Sulphuris. C.H., U.C.H.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Confection of Senna 1, Confection of Sulphur 1.

Pulvis Guaiaci Compositus (Chelsea Pensioner).

Dose.—20 to 40 grains (1·2 to 2·6 Gm.).

Guaiacum Resin, Precipitated Sulphur, Heavy Magnesium Carbonate, Gum Acacia and Potassium Bicarbonate, equal parts. The Confection (*v.* above) is more used.

Jephson's Powder. *Dose.*—60 grains (4 Gm.).

Precipitated Sulphur 2, Guaiacum Resin 1. For tonsillitis, acne, and constipation.

Tablets of Precipitated Sulphur 5 grains with Potassium Acid Tartrate 1 grain are prepared.

'Stearettes' of Sulphur 5 grains each are prepared.

In the alimentary canal the action of Sulphur only takes place at a point where its contents have ceased to have an acid reaction, and the formation of H_2S and Sulphides will be hastened by an increase in alkalinity. 'Stearettes' of Sulphur are hence suggested in the treatment of acne, furunculosis, urticaria, etc.

Trochisci Sulphuris (*B.P.* '14). *Dose.*—1 to 6.

Contain approx. precipitated Sulphur 5 grains and Acid Potassium Tartrate 1 grain. For skin and rheumatic affections.

Garrod's formula is 4 grains of the Sulphur with 1 grain of Potassium Acid Tartrate in each. See also **Pastilli.**

Unguentum Sulphuris (*B.P.* '14). 1 to 9 Benzoated Lard.

Scabies is treated by Sulphur Ointment after washing with soft soap. Use equal parts of the B.P. Ointment and Vaseline.

Unguentum Sulphuris et Zinci cum Kaolino. Sulphur 4, Zinc Oxide 3, Kaolin 1, Benzoated Lard 8. For sweating of the feet.

Ⓟ **Unguentum Sulphuris cum Hydrargyro,** U.C.H.

Sublimed Sulphur 30, Sublimed Mercuric Sulphide 2, Ammoniated Mercury 2, Arachis Oil 12, Lard 54. Useful in skin diseases.

Unguentum Sulphuris Camphoratum E.L.

Precipitated Sulphur 10, Phenol 15, Camphor 15, Solution of Coal Tar 15, Vaselin 220, Benzoated Lard to 440.

Unguentum Wilkinson. *Syn.* WILKINSON'S OINTMENT. P. JAP. IV.

Triturate together Sublimed Sulphur 1, Tar 1, Potash Soap 2, Benzoated Lard 2, Purified Talc 0·5. (TAR, P. JAP. is from several species of *Pinus.*)

Unguentum Sulphuris Hypochloritis.

Sublimed Sulphur 12, Essential Oil of Almonds 2, Prepared Lard 84; mix and add with quick manipulation Sulphur Chloride 2 (a Reddish Liquid S_2Cl_2=135·034).

Keep in a stoppered bottle; is sometimes made double this strength. Useful in acne, psoriasis and scabies.

Unguentum Sulphuris Iodidi (*B.P.* 1898). Contains Sulphur Iodide 4 (S_2I_2=317·984), Glycerin 4; mix in a warmed mortar, and add Benzoated Lard 92. For tinea.

Unguentum Sulphuris et Naphthol Salicylatum.

Tinea circinata can be rapidly cured by an ointment of Sulphur ½ drachm, Salicylic Acid 10 grains, Naphthol 3 grains, Yellow Soft Paraffin 1 ounce.

Sulphuretted Hydrogen Solution.
Is prepared by saturating Distilled Water with Hydrogen Sulphide (H_2S). To preserve, add a little Carbon Di-sulphide.

Lotio Sulphuris cum Sapone.
Precipitated Sulphur 30, Eau de Cologne 60, Glycerin 4, Soft Soap ½, Rose Water to 500. Is recommended for acne of the face.—W. W. W.

Lotio Sulphuris, C.X.
Precipitated Sulphur 20 grains, Glycerin 10 minims, Methylated Spirit 15 minims, Lime Water 2 drachms, Water to 1 ounce.

Lotio Sulphuris Composita, C.X.
Precipitated Sulphur 15 grains, Zinc Sulphate 15 grains, Sulphurated Potash 15 grains, Water to 1 ounce.

Sulphaqua Charges are for dissolving in water to produce sulphur baths for use in skin diseases, gout and rheumatism.

Balneum Sulphuratum. St. Th. H. Sulphurated Potash ⅛ to ¼ ounce per gallon. **St. M.'s H.** is 10 ounces to 30 gallons.

Pomatum Antipsoricum, F.E. *Syn.* **Helmerich's Pomatum.**
Sublimed Sulphur 10, Distilled Water 5, Almond Oil 5, Potassium Carbonate 5, Lard 35. All by weight. Is used for scabies.
Fr. Cx. has poppy seed oil *vice* almond oil.

'Danish' Ointment for Scabies.
Dissolve 1 kg. Sublimated Sulphur at gentle heat in 2 kg. 50% *w/w* Caustic Potash Solution. Mix without heating 225 Gm. each of Vaseline and Anhydrous Lanoline, and add 375 Gm. of the Sulphur solution. Prepare fresh Zinc Hydroxide by mixing 28 Gm. Zinc Sulphate and 40 Gm. 20% Sodium Hydroxide, and add to the ointment; add Liquid Paraffin to 1000 Gm.; and Benzaldehyde 5 Gm. to check unpleasant odour produced when the ointment is placed on the skin. Efficacy due to the polysulphides. The ointment is soft, of dark brown colour, and not unpleasant odour.

After cleansing, rub the ointment lightly all over the body, covering all skin; wait 15 minutes and then go to bed. Take second bath at same time next day, and wear fresh underclothing, and cure is finished. Clothes are disinfected.—Svend Lomholt, L. ii./20,1251; *see also* Jl. A.M.A. ii./25,1748.

A certain cure for scabies or itch.—A. Cannon, B.M.J. i./30,148.
Composition of Danish Ointment discussed.—B.M.J. i./30,985 (W. H. M.), 1080,1204.

***Contramine** (T.M. 422175). *Syn.* Diethyl-ammonium diethyl-dithiocarbamate. $SNH_2(C_2H_5)_2CSN(C_2H_5)_2 = 222{\cdot}3076$.

Dose.—Intramuscularly ¾ grain (0·05 Gm.) to 4 grains (0·25 Gm.) in 1 to 2 Cc. of cold sterilised water or saline. *Must not be heated.*

The usual initial dose (intramuscularly) is 0·125 Gm. in 1 Cc.

Occurs as white crystals, soluble 1 in 2½ of water.

Manufacture.—An addition product of Carbon Bisulphide and Diethylamine. This is a general reaction for primary and secondary aliphatic amines.

Uses.—In the chronic complications of gonorrhœa, including stricture, chronic epididymitis, conjunctivitis and iritis, and varied forms of muscular rheumatism, also in chronic skin affections—acne vulgaris, acne rosacea seborrhœic eczema and chronic dermatitis.

Contramine Pessaries are convenient for chronic cervitis and endometritis. Local application of Contramine solution may assist healing of chronic ulcers. In cases of sinuses in muscles, closure is often obtained by intramuscular injections around the lesion.

In severe cases of metal intoxication 0·125 Gm. may be injected intramuscularly every day till 6 or more doses have been given. In other cases two injections of 0·125 Gm. with a week's interval usually suffice.

Salvarsan-Jaundice, causation and treatment with aid of Contramine.—F. Chamberlain, L. i./22,733.

Thio-Histamine.

Dose.—May be injected intramuscularly in doses of 0·001, 0·002 and 0·003 Gm. on three successive days. If a second course is given at least 4 weeks must elapse.

A Sulphur compound derived from Histamine (*q.v.*).

Uses.—In neuritis action similar to Contramine but quicker, hence more suited in acute cases, as against Contramine in chronic cases. Relieves pain.

Selenium (Se=79·2) and **Tellurium** (Te=127·5).

The element Selenium was originally discovered by Berzelius in the Lead Chamber-deposits in the manufacture of Sulphuric Acid. It occurs in various Blendes and minerals,—with Lead, Copper, Silver, Iron, etc.—at least three allotropic varieties are known. The chief source of Selenium is Iron Pyrites in which a part of the Sulphur is replaced by Selenium. Traces of Selenium occur in Bismuth preparations.

Selenium and Tellurium belong to the Sulphur group. Selenates and Tellurates are highly poisonous—unlike Sulphates.

Colloidal Selenium, see **Colloidal Metals.**

Selenium Oxide. *Dose.*—1/64 grain (**0·001 Gm.**) internally 3 to 4 times daily increasing the dose gradually.

CANCER has been treated with this, on the assumption that it conveys Oxygen to the Sulphur in the organism, thereby increasing secretion of Sulphuric Acid in the urine. It has been observed that Sulphuric Acid excretion is lessened in cancer patients.

Selenium preparations do not easily lose their effectiveness as oxidising agents. In the body they constantly move between the higher and lower degrees of oxidation, and their oxidising power is thereby constantly regenerated. *For use in cancer. See* p. 370.

Conductivity of electricity by metallic Selenium is increased by light. This is made use of in the **Optophone** invented by Dr. F. d'Albe, which enables the blind to read print.—B.M.J. i./21,574.

For Organic Selenium Compounds, see Vol. II.

Tellurium in Syphilis.—Experiments on rabbits showed that apparently Tellurium injected becomes soluble by combining with tissue protein. Tellurium Metal, the Oxide TeO_3, and the Iodoquinate, have been used clinically by Fournier and others with disappearance of spirochætes. 5 Cc. of 5% Tellurium suspension intramuscularly in ½ to 1 Cc. doses at intervals of 5 to 7 days. Toxicity appears to be slight. Methyl Telluride excreted with strong smell of Garlic a disadvantage, persisting 6 to 8 months. Loss of hair pigment observed. Tried in Wassermann-fast cases with apparent success.—A. D. Frazer, L. ii./30,133; see also C. Levaditi, B.M.J. ii./28,537.

SUPPOSITORIA.

Suppositories containing various Medicaments weigh, when prepared with Cacao Butter, 15 grains and upwards. They are preferred with both ends conical shaped so as to pass more easily and be retained by the sphincter muscle.

Suppository Mass for Use in and Export to Hot Climates, (a) **Gelatin Basis.**

As pointed out under Ovule Masses, it is almost impossible to make a basis that shall stand temperatures above 100° F. and yet melt at

body temperature. The best one can do is to fortify with Gelatin so that the melting point is *not much above* 98° *to* 99° *F.*

Bougie Mass (*q.v.*) carries out these conditions when there is a sufficiency of adherent moisture on the part.

(b.) Theobroma Basis.—

The *B.P.* '14 statement on the subject is, "More or less Beeswax may be used in place of Theobroma according to prevailing temperatures," 5 to 10% is commonly employed. We consider 15% is best, but it must be remembered that different samples of Theobroma Oil and White Wax each have somewhat different melting points. Certain Melting Points we find are yielded by mixtures in proportions stated under "Ovule Masses for Hot Climates." The remarks there given apply equally to Suppositories with Theobroma Oil basis.

Urethral Bougies. These are of **gelatin basis** in *two* lengths, namely, 2½ inches and 4 inches, and are directed to be dipped in warm water prior to insertion. For various contents, *see* Index. (U.S. requires 7 Cm.=2¾ inches, weighing about 2 Gm., and 14 Cm. =5½ inches, weighing about 4 Gm. respectively.) They are also made of **Cacao Butter** of *any* length up to 6 inches if desired, and of six sizes, with the following diameters:—No. 1, ⅛ inch; No. 2, $\frac{5}{32}$ inch; No. 3, $\frac{3}{16}$ inch; No. 4, $\frac{7}{32}$ inch; No. 5, ¼ inch; No. 6, $\frac{5}{16}$ inch. For the treatment of gonorrhœa in its various stages Those of Cotarnine (*q.v.*) are used to check bleeding.

The **U.S. Urethral Bougies** made with Oil of Theobroma are 7 Cm. and 14 Cm. long and weigh about 1 and 2 Gm. respectively.

Aurinaria. Ear cones or aural bougies made with Cacao butter basis.

Acidi Borici 1 grain.
Acidi Carbolici $\frac{1}{10}$ grain.

℞ P1 Cocainæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ grain.
Unguenti Hydrargyri Nitratis ⅛ grain.
Iodoformi ½ grain.

℞ P1 Morphinæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ grain, atque cum Cocaina $\frac{1}{10}$ grain.

℞ P1 Morphinæ $\frac{1}{10}$, Cocainæ Acidi Borici 1 grain.

℞ P1 Morphinæ $\frac{1}{10}$ grain, Ext. Bellad. $\frac{1}{5}$ grain.

℞ P1 Opii, $\frac{1}{5}$, ℞ P1 ½ grain.
Plumbi Acetatis ½ grain, atque cum Acid. Borico 1 grain.

℞ P1 Plumbi Acet. et Opii $\frac{1}{5}$ grain.
Zinci Sulphatis ½ grain.
Zinci Sulphocarbolatis ½ grain.

They should be retained with a pledget of cotton wool.

Tampons.—For vaginal and uterine medication the following are made. The pledgets are globular in shape, about 1½ in. in diameter, composed of **wool, gauze covered.**

Glycerin Tampons.—Saturated with glycerin. **Argyrol Tampons,** containing 1, 5 and 10% Argyrol in Glycerin. **Ichthyol Tampons** saturated with 5, 10 or 20% Ichthyol in Glycerin. **Iodoform Tampons,** S.H., with 5% Iodoform in Glycerin.

TABLETTÆ.
(Compressed Tablets).

In the preparation of Tablets the material has to be *granulated,* to make it flow easily from the machine; this is effected by moistening with a little alcohol or water (to which, if desired, a minute quantity of mucilage diluted about 1 to 4, may be added), rubbing through a suitable sieve (No. 16), and drying *thoroughly* either by

slight heat, or better, by exposure to the air if sufficiently dry at the time. The decomposition, melting points or volatility of the chemicals to be compressed must be borne in mind, Salol, Beta-Naphthol, Benzoic Acid, Sulphonal, Trional and Phenacetin should not be heated. To obviate the sticking referred to, lubrication with Boric Acid (2%), or spraying with a solution of Soft Paraffin or Cacao Butter in 1 in 6 each Ether and Alcohol, or less of the latter are resorted to in some instances.

Substances already in small crystals, *e.g.*, Potassium Chlorate and Ammonium Chloride, do not require this treatment. Tablets *to dissolve like lozenges* require half their weight of a mixture of equal parts of Acacia and Tragacanth. Owing to ***Incompatibility***, Sodium Bicarbonate and Calomel, Saccharin and Rhubarb, Salol and Camphor, Salol and Thymol, Caffeine Citrate with Acetanilide and Antipyrin, Salicylic Acid and Iron Compounds, Chloral and Alkalis, Mercuric Chloride and Metals, oxidising agents, *e.g.*, Potassium Chlorate and Permanganate, with Charcoal, Sulphur, Iodine or Sugar, should not be compressed together.

Five or ten per cent. of potato starch thoroughly dried is useful to ensure rapid breaking up of the Tablet. Deliquescent compounds should be treated with Gum Acacia or Tragacanth.

Similarly, if the powder is of a very dusty nature the judicious use of a little of these gums or of glucose is an advantage. Fibrous drugs may have 5% Dextrin. Many substances if compressed too hard are liable to cause the tablet to crack—this is particularly the case with Phenacetin and Antipyrin—the least possible amount of pressure should be applied that will produce a permanent tablet.

'Capping,' *i.e.*, splitting off of the surface of the tablet is due to too much pressure, or, it may be, a worn-out punch, or to moisture or too much lubricating powder.

The majority of 5-grain Tablets are made to weigh $6\frac{1}{4}$ grains with Milk Sugar. Substances of small dose, *e.g.*, Arsenic, Morphine, and Strychnine are made up to a definite weight, *e.g.*, 1 grain with this diluent. *Further notes on the subject, Edn. XIX., p.* 802.

Stearettes, *i.c.*, Tablets coated so as to be more likely to dissolve in the intestines than in the stomach, *vide* p. 690.

Tablet Triturates are made in metal or vulcanite moulds which are worked by hand, yielding 50 to 200 at a time, the weights ranging from $\frac{1}{2}$ grain (0·03 Gm.) to 1 grain (0·06 Gm.) and the diameters between $\frac{1}{8}$ and $\frac{5}{32}$ inch, and $\frac{1}{8}$ inch in depth. The active ingredient is mixed with Lactose or Sugar, the whole being massed together with a little alcohol or alcohol and water.

For Hypodermic Tablets, Sterilised Milk Sugar, or Cane Sugar is a useful diluent. These are prepared under aseptic precautions. A little Boric Acid is useful as lubricant. Dried Neutral Sodium Sulphate, Sodium Chloride and Ammonium Chloride are also employed in some instances. Hypodermic Tablets are well made in a Tablet Triturate mould with holes $\frac{5}{32}$ in. in diameter, the plate being $\frac{1}{10}$—$\frac{1}{8}$ in. in depth.

Notes on Manufacture of Tablets.—P.J. ii./08,276 ; ii./11,432.

For List of Tablets in general demand, *see* Index.

TEREBENUM.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A colourless liquid consisting of dipentene and other hydrocarbons, produced by the action of sulphuric acid on oil of turpentine and distillation. Sp. Gr. 0·862 to 0·866—*B.P.* '14. It has an agreeable odour resembling fresh-sawn pine-wood. Boils at 160 to 172° C. U.S.

Soluble about 1 in 4 alcohol 90% and in all proportions in absolute alcohol or chloroform. It is not miscible with water, but may be emulsified by mixing it with one sixth its weight of tragacanth powder, then adding water and shaking.

Uses.—An agreeable antiseptic, disinfectant, and deodoriser. The vapour is a useful sedative and antiseptic inhalation in whooping cough and in hay fever. 5-minim **Capsules** or **Pastils** are made. Useful in dysentery *per os.*

In excess it may produce albuminuria and hæmaturia.

WHOOPING COUGH cured by 1 to 2 minims on sugar occasionally.—L. ii./29,34.

PRURITUS.—Recurrent cases often accounted for by worry. Terebene on sugar is a good intestinal disinfectant and stimulant, also useful in urticaria in children, *e.g.*, in a mixture with Magnesium Carbonate.—L. ii./12,968.

Vapor Terebeni, T.H.

Terebene 40 minims, Light Magnesium Carbonate 20 grains, Distilled Water to 1 ounce. A teaspoonful in a pint of water at 140° F. for inhalation. For medicating antiseptic respirators, 10 drops of a mixture of equal parts, Terebene, Phenol, and Spirit of Chloroform, is often used.

Terpinum Hydratum, U.S. X. FR. CX., P. HUNG. Ph. Ned. V., P. Belg. IV.—*Syn.* TERPINE. $C_6H_8(OH)_2.CH_3.C_3H_7+H_2O$= 190·1716.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**) or more, in cachets, slipules, or pills, or suspended.

Prepared by acting during cold weather upon Rectified Oil of Turpentine 4, Alcohol 80% 3, with Nitric Acid 1 in flat dishes. Crystals separate after several days, and are recrystallised from 95% Alcohol rendered slightly alkaline. Yield 12% of the oil taken.—Caspari.

Sir W. A. Tilden, Prof. W. H. Perken, and J. C. Umney on Terpenes.—P.J. i./12,581,651,723,756,817; P.R., July, 1912.

A derivative of oil of turpentine in prismatic crystals, soluble in water about 1 in 250, 1 in 44 of alcohol 90%, and about 1 in 6 in oils.

Flavoring.—Prescribed as **Linctus Pini Terpin et Heroin** *q.v.*

Uses.—Lessens cough; has been used with success in bronchitis, chronic and subacute; it assists expectoration, *e.g.*, in initial catarrh of phthisis; useful as a hæmostatic in bleeding from lungs. Diuretic.

Terpinol. *Dose.*—1½ minims (**0·1 Cc.**) or more in pill, or gelatin capsule. An agreeably aromatic liquid, containing bodies of the composition $C_{10}H_{16}$= 136·1248 and $C_{10}H_{18}$=138·1404. Is obtained by the action of dilute sulphuric acid on terpene. Miscible with alcohol in all proportions, but insoluble in water. It is used for lung affections; if it disorders the stomach it should be given with meals. In pulmonary hæmorrhage in 3 drop doses used with advantage.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

Methylene Blue dissolves in boiling Terpinol producing a colourless solution; the colour, however, precipitates again on cooling.—W. T. Robinson.

Terpineol. *Syn.* TERPILENOL. $C_{10}H_{17}OH=154{\cdot}1404$. A product of fractional distillation of Terpinol, Sp. Gr. 0·940 used for disguising odour of Iodoform and for scent making (in the name of Artificial Lilac). *Syn.* **Cinyl Alcohol**, described.—Allen, 1911, Vol. IV, p. 280.

THEOBROMA.

The seeds of Cacao, *Theobroma Cacao* (*Sterculiaceæ*). When heated and deprived of husk and membrane, these yield **Cocoa nibs.** The nibs ground, and most of the oil pressed out, produce, when reduced to powder, the best forms of **Cocoa** for use as a beverage.

Cacao Shell as cattle fodder.—P.J. i./31,371.

For further details on Cocoa, see Vol. II.

Oleum Theobromatis, *Syn.* CACAO BUTTER. CACAO OLEUM, P. Belg. IV.

The concrete oil of the seeds (yield about 45%). Melting at about 86 to 91·4 F. (30 to 33° C.), *i.e.*, below the temperature of the body, is much used for suppositories. For substances which lower the melting point of the oil, and for export to hot climates, it is well to add 5 to 15% yellow wax. (*Cf.* ' Ovules.')

Note on Cacao butter and substitutes.—P.J. ii./09,158.

To deodorise for cooking, it has been suggested to heat the oil in an open pan to 370° F. for five minutes and cool again, and, to give it butter consistence, to add to each 4 parts of cacao butter melted, 5 parts of cotton seed oil.

Pasta Theobromatis, Chocolate.

This is made by grinding the nibs into a paste, with sugar and vanilla or other flavouring added; it should contain not more than 50% of sugar and about 25% of fat (*Oleum Theobromatis*), and be free from gum, added starch, or other admixture.

The author uses chocolate for the preparation of medicated **Tabellæ.** It is useful for many medicines. The solvent action of its fat renders it eminently useful for fixing **Nitro-glycerin, Erythrol Nitrate, Mannitol Nitrate, Menthol,** and alkaloids. For list *vide* Index—Tabellæ.

Theobromina. Ph. Ned. V.

$C_5H_2(CH_3)_2N_4O_2=180{\cdot}0944$. *Syn.* DIMETHYL-XANTHINE, SANTHEOSE.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

This alkaloid constitutes about 1 to 2% of the seeds, in white crystalline powder, *sparingly soluble* in water, alcohol and ether. Caffeine is trimethyl-xanthine. 2% solutions may be obtained with aid of Tri-Sodium Phosphate.

Uses.—As a diuretic, relieves cardiac and renal dropsy (but some think it bad therapy to put extra work on diseased kidneys), and in angina pectoris, 20 to 30 grain doses spread over 24 hours lessen the frequency and severity of attacks. Given in cachet and pill.

Determination of Theobromine by methylation to Caffeine.—P. A. W. Self and W. R. Rankin, P.J. ii./31,75.

Has elective action on elimination of chlorides, and increase of urinary chlorides follows. Some hold it should be limited to nephritis with œdema, accompanied by chloride retention. In other forms may be harmful.—B.M.J.E. i./30,74.

Theobromine-Sodium-Sodio Acetate. *Syn.* **Theo-Sod-Acet.**
✱Agurin (T.M. 235517, 322517). $C_7H_7N_4O_2Na+NaC_2H_3O_2$ =284·504.

Dose.—10 to 15 grains (**0·6 to 1·0 Gm.**), up to 45 grains daily in fresh solution. 'Slipule' No. 00 holds 10 grains.

White crystalline hygroscopic powder soluble 1 in 2 of water and about 1 in 200 of alcohol 90%. In dropsy, sciatica and neurasthenia. Is strongly diuretic in action. Not to be given with acid substances, nor with sugar or gum, and in general *incompatible* as for Theo-Sodo-Sal *q.v.* To be preserved from the air, the CO_2 of which tends to decompose it. Relieves cardiac dropsy.

Theobrominæ et Sodii Salicylas (*B.P.* '14).—*Syn.* **'Theo-Sodo-Sa', ✱Diuretin** (T.M. 223214). P. Austr., F.E. VIII., Ph. Ned. V. P. Ital. V., P. Belg. IV. $C_7H_7NaN_4O_2+C_6H_4(OH)COONa$= 362·1196. *Dose.*—10 to 20 grains (**0·6 to 1·2 Gm.**). Max. dose *pro die* 90 grains. Slipule No. 00 holds 10 grains.

Manufacture.—Rub Theobromine 18 to a paste with water 10. Dissolve Sodium Hydroxide 4 or *q.s.* in water 8 and add to the Theobromine until clear. Add Sodium Salicylate 16, filter and evaporate on a water bath or *in vacuo.*

A sodio-salicylic compound containing about 50% of sodium-theobromine in white powder, soluble 1 in 1 in water (a little Sodium Salicylate added will often 'clear' a strong solution). This solubility we find refers to the freshly made compound.

It is rapidly decomposed in moist air with absorption of CO_2 and liberation of Theobromine—hence less soluble in water. It must be kept in *stoppered* bottles. B.P. requires 40% Theobromine, U.S.P. 46·5%. Theory for $Na_2C_{14}H_{12}N_4O_5$ is 44·19% Sodium Salicylate and 55·81% Sodium Theobrominee. C. T. Bennett and F. B. Windle recommend new method for analysis.—P.J. i./21,472.

Incompatibles: Theobromine Sodium Salicylate and Theophylline Sodium Acetate are incompatible with Ammonium Salts, Sodium Bicarbonate and all acid salts, alkaloidal salts, free inorganic and organic acids, and Aromatic Spirit of Ammonia.—J. W. Plenderleith, P.J. i./23,364.

Flavoring—Glyl Lavandulæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Diuretic (*cf.* Theobromine), without affecting nervous system and causing sleeplessness. Safe for scarlatinal dropsy of children. In angina pectoris it lessens the frequency of attacks. Given for cough.

Tablets contain 5 grains.

Angina Pectoris treated with Purine-base Diuretics of value, but little to choose between any of the Theobromine preparations. To avoid tolerance, over a long period, the following (or some of them) were used on alternate weeks—Theobromine 5 grains, Theobromine Sodium Acetate 10 grains, Theobromine Sodium Salicylate 10 grains, Theobromine Calcium Salicylate 7½—10 grains, Theophylline 2 grains, Theophylline Sodium Acetate 4 grains, Theophylline-ethylenediamine 1½—3 grains. Four doses daily usually given (often best taken *in the middle of a meal*) for the first 4 days of each week. Will not give complete relief, but more helpful than any other drugs used.—N. C. Gilbert and J. A. Kerr, Jl. A.M.A. i./29,202.

Theobromine Calcium Salicylate. *Syn.* ✱CALCIUM-DIURETIN, THEOCALCINE. $Ca(C_7H_7N_4O_2)_2+Ca(C_6H_4OH.COO)_2=712{\cdot}3912$.

Dose.—7 to 15 grains (**0·5 to 1 Gm.**). **Tablets,** $7\frac{1}{2}$ grains (**0·5 Gm.**) each.

Manufacture.—Prepared similarly to the Sodium salt from Theobromine, Calcium Oxide, and Calcium Salicylate.

A white powder slightly soluble in water, containing about 48% Theobromine and 11% Calcium.

Uses.—Similar to Theobromine Sodium Salicylate.

For arteriosclerosis 30 grains have been given daily.

ASTHMA.—Calcium Diuretin taken once or twice in the evening stated to be an almost certain preventive.—B.M.J.E. i./26,16.

Iod-Calcium-Diuretin. *Syn.* IODO-THEOBROMINE-CALCIUM-SALICYLATE.

Tablets contain $7\frac{1}{2}$ grains Calcium-Diuretin, and $1\frac{1}{2}$ grains Potassium Iodide.

Dose.—One thrice daily after food: may be increased temporarily to 2 tablets thrice daily. As improvement sets in the smaller dose should be resorted to and may be maintained for lengthy periods.

In hypertonia, angina pectoris and asthma.

Rhodan-Calcium-Diuretin. *Syn.* RHODAN-THEOBROMINE-CALCIUM-SALICYLATE.

Tablets contain $7\frac{1}{2}$ grains Calcium-Diuretin and $1\frac{1}{2}$ grains Potassium Sulphocyanide.

Dose.—One tablet thrice daily after food: 2nd and 3rd weeks one tablet thrice daily: 4th, 5th and 6th weeks one tablet once daily. Crush in a little water or milk before swallowing.

For treatment of hypertonia of climacteric or sclerotic origin, and in renal cases.

Iodo-theobromine. (*Syn.* **Theobromine Sodium-Iodo-Salicylate**).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

White powder, containing about 40% Theobromine with 22% Sodium Iodide and 38% Sodium Salicylate, soluble in water, is a good diuretic and heart stimulant, increasing blood pressure. In cirrhosis of the liver and acute nephritis.

Theobromine-Sodio Sodium Iodide. *Syn.* EUSTENIN.

$C_7H_7N_4O_2.Na.NaI=352{\cdot}0126$.

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

Has been given in arteriosclerosis, angina and aortic aneurism.

Compound Theobromine Tablets.

Dose.—Up to six during the day, increased if necessary. To be continued for 10 days and then stopped.

Theobromine 3 grains (0·2 Gm.) Potassium Iodide $1\frac{1}{2}$ grains (0·1 Gm.) Potassium Nitrate 3 grains (0·2 Gm.) and Sodium Nitrite 1/12 grain (0·005 Gm.).

A preparation on these lines is used abroad in treatment of arteriosclerosis angina pectoris and excessive use of tobacco.

Theobromine Valerianate.

Dose.—5 grains (**0·3 Gm.**). A loose combination embodying the properties of the two constituents.

Theophylline, U.S. X. DIMETHYL-XANTHINE. (Isomeric with Theobromine).

Syn. ✱THEOCIN. (T.M. 247465, 322570) $C_5H_2(CH_3)_2N_4O_2=180{\cdot}0944$. (*See also* p. 244.)

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

White crystalline powder, soluble 1 in 200 (by experiment) of cold water and about 1 in 90 of Alcohol (90%). M.pt. 269—272° C. Marked diuretic. Has been found useful in heart affections attended with symptoms of congestion, and nephritis with dropsy. **Tablets** weigh 4 grains.

Theophylline-Sodio Sodium Acetate (contracted to 'THEOPHYLLINE SODIUM ACETATE').

$C_5H_2(CH_3)_2N_4O_2Na.NaCH_3COO = 284{\cdot}2238$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**) dissolved in water, three or four times daily after meals.

Nausea may be prevented by small doses of Menthol beforehand, *e.g.* $\frac{1}{10}$ grain in 15 minims of Tincture of Orange.

The compound is made on the lines of the analogous Theobromine Compounds (*vide antea*).

White flocculent powder.—*Soluble* about 1 in 20. For œdema and dropsy of cardiac origin. For excitable neuropathic individuals. Paraldehyde may be given simultaneously.

Three out of 12 samples of commerce found to be Theobromine Sodium Acetate. Analysis.—G. J. W. Ferrey, P.J. ii./31,75.

Theophylline Sodium Acetate Tablets—4 grains are prepared.

The addition of Theocin to digitalis therapy in dropsy often "tips the balance" and makes the kidneys act. Has proved suitable when both heart and kidneys are diseased. The action is often very striking—within an hour. If no effect is manifested within 24 hours, or after 40 grains, it is of little use continuing the drug.—G. A. Sutherland, L. i./17,441.

EPIDEMIC NEPHRITIS.—Appeared to act as a renal irritant as well as diuretic and unsuitable in acute cases. The same is true of Diuretin.—Langdon Brown, L. ii./16,863.

***Euphyllin.** (T.M. 306214.) Theophylline Ethylenediamine $(C_7H_8N_4O_2)_3.(NH_2.CH_2.CH_2.NH_2)_2$.

Dose.—**Tablets** contain $1\frac{1}{2}$ grains (**0·1 Gm.**), 3 or 4 of which may be taken daily. **Euphyllin Suppositories** contain 0·36 Gm. **Euphyllin Ampoules,** 2 Cc., contain 0·48 Gm. One to 3 ampoules may be given daily intramuscularly. Intravenously half an ampoule is given with 9 Cc. 20% Glucose, or with distilled water, and is injected slowly.

Yellowish white crystals with ammoniacal odour and alkaline reaction.

Uses.—In œdema of cardiac and renal origin and in cases associated with arteriosclerosis. When cardiac debility is present Digitalis to be given for some days before. Effect is noticed shortly after taking and usually reaches maximum on the first day. Within two or three days 15 litres of urine may be passed, when treatment should be discontinued and only resumed if necessary. It is stated there is no irritation of the kidneys.

THYMOL.

B.P. '14, ACIDO TIMICO, F.E. VIII., P. Belg. IV., P. Ital. V.

$C_6H_3(CH_3)(OH)C_3H_7$, 1 : 3 : 4, = 150·1092.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**), in pills with soap and a trace of Alcohol, or in oily or aqueous solution. *Anthelmintic Dose.*—15 to 30 grains (**1 to 2 GM.**). U.S. states 2 Gm. divided into 3 doses. F.E. states max. in 24 hours 1 to 2 Gm.

A Phenol obtained from the oils of *Thymus vulgaris, Monarda punctata* (*Labiatæ*) and *Carum copticum—Umbelliferæ.* The oil of the last mentioned is *B.P.* '14 as Oleum Ajowan with not less than 40% Thymol.

Ocymum gratissimum Oil as a source of Thymol (39·15%). Widely spread in East Indies, Ceylon, Java, tropical Africa and Central America. Cultivated on the Ivory Coast.—P.R., 1923,14,154; Y.B.P., '23,113.

For further sources and details and for Synthetic Thymol, see Vol. II.

Monarda Punctata Oil contains 60% Thymol. *Origanum hirtum* growing in Crete and Dalmatian coast contains 60—67%. *Mosia Japonica* 44%. Wild Thyme of France 20%.

U.S. allows synthetic, *e.g.*, from Cymene or meta-Cresol, or made from Piperitone derived from various species of Eucalyptus.

Owing to competition of synthetic Thymol it is no longer profitable to prepare natural Thymol from Indian Ajowan Seed. Ajowan Seed grown in Seychelles gives twice the yield of oil of Indian Seed.—Imp. Inst. Rept., 1929.

Omam.—*Syn.* **Ajowan.** The drug is given in the dose of 10 to 30 grains (0·6 to 2 Gm.) as Extractum Ptychotis Liquidum P.I.

Aqua Ptychotis P.I. (Omam water) made by distillation with the fruit is given in the dose of 1 or 2 ounces (30 to 60 Cc.). The dose of the volatile oil is 1 to 3 minims (0·05 to 0·2 Cc.).

Thymol is in large transparent crystals melting at 111° F. having the odour of thyme and a burning taste.

Soluble 1 in 1,500 of water, 1 in 200 of glycerin, 1 in 8 of alcohol and glycerin, equal parts ; soluble in fats and oils, and 8 in 3 of alcohol 90%, and freely soluble in ether, acetic acid and caustic alkalis. Liquefies Menthol, Chloral Hydrate, Camphor and Phenol.

Uses.—Externally a powerful antiparasitic, also for certain stages of eczema and psoriasis (*see* Unguentum) and for burns (*see* Volckmann's solution). A powerful antiseptic. (Our experiments prove this, *cf. Antiseptic Powers, Vol. II.*). It is also a good deodorant. May colour the urine green. The administration simultaneously with or immediately after a large dose of a solvent of thymol, *e.g.*, alcohol, should be avoided. May be inhaled (*see* Vapor).

Ankylostomiasis.—

Extensive experience indicates ***maximum dose of 60 grains*** for a healthy adult man and 45 grains for a woman, and in pregnant women, or cases with very bad infection, and in elderly patients, or those with heart disease, or extreme debility, 30 grains or less, the dose being given in two or three divided doses of 15, 20 or 30 grains, each at one or two hour intervals followed by strong saline purge. Give in ***hard gelatin capsules.*** Do not repeat in less than a week, and prohibit alcohol, fats, vinegar, and other solvents of Thymol on day of treatment. The dangers of Thymol are overrated, but untoward effects in patients with chronic disease of the intestine and in œdematous patients. ***Most effective on hookworms,*** but usually fails to remove heads of tapeworms.—R. N. Chopra and A. C. Chandler 'Anthelmintics and Their Uses' (Balliere, Tindall & Cox, 1928).

Ankylostomiasis treated by ½ drachm dose of Beta-Naphthol and Thymol ½ drachm in a one ounce draught, repeated.—H. G. Phippen, B.M.J. i./23,371.

Thymol, 3 cachets of 15 grains, given at intervals of 2 hours—routine treatment.—N. Cantlie, Jl. Trop. Med., Feb. 1, '23,42.

In large doses causes gastro-intestinal irritation, tinnitus and deafness, dyspnœa with slowing of respiration, acceleration and then slowing of pulse and fall of temperature. It is best given with ***equal quantity of Lactose*** or Sodium Bicarbonate.—Jl. A.M.A. i./29,744.

For mode of infection, details of the parasite and further notes on treatment of ankylostomiasis, vide Carbon Tetrachloride this Vol, and Vol. II. (Bacteriological Notes).

TÆNIA.—One or two doses of 5 grains in the early morning with a tumblerful of water generally causes tapeworm to be passed in a stool in the evening.—George V. Perez, B.M.J. ii./13,49.

GOITRE.—Cases treated by 10 grain doses twice daily. Patient's dietary should contain no solvent of Thymol. Give as coarse powder and wash down with draught of water. In some cases swellings in the neck disappear rapidly. β Naphthol also beneficial.—L. i./13,368.

Skin sterilisation. A 5% Alcoholic Solution of Thymol has been used in the place of Iodine Tincture prior to operation. Two applications are made with an interval of five minutes, three minutes after second application the operation may be started.

Thymol Disinfectant (*Martindale*).

This preparation was made during our investigation of the antiseptic power of Essential Oils (*q.v.*). It is a potent antiseptic having a Rideal-Walker Carbolic Acid Co-efficient of 8. It is employed as a general disinfectant and for instruments and in less strength for use to mucous membranes. For *Medical Purposes* a 0·1% (10 minims to the pint) dilution with water, forming a white emulsion, will have the same bactericidal power as a 1% Solution of Phenol. A stronger proportion than this (which would contain 1 of actual Thymol in 3,000) cannot well be tolerated—hence should be used with caution as it causes a temporary stinging sensation.

For *General Disinfection* 1 in 200 (one tablespoonful to 5 pints).

Liquor Thymol. 1 in 800 of warm water.

This saturated aqueous solution is used diluted as an antiseptic gargle, undiluted it is too strong.

Lotio Potassii Thymatis U.C.H.

Thymol 8, Solution of Potash 120, Glycerin 16, Water to 1,000.

Mistura-Oleo-Balsamica.—*Syn.* Balsamum Vitæ Hoffmanni. 'Tincture of Life.' *Dose.*—1 to 4 drachms in water.

Oils of Lavender, Thyme, Lemon, Nutmeg and Orange Flowers of each 4 ; Oil of Cloves and Cinnamon $3\frac{1}{2}$ of each ; Balsam of Peru $10\frac{1}{2}$; Alcohol 90% to 1,000 ; allow to stand a few days, then filter.

A remedy for snake bites in Africa. A carminative stimulant.

Pastilli Thymol contain $\frac{1}{3\frac{1}{2}}$ grain.

Pigmentum Thymol.

Thymol 1, Ether 10, and Spirit 5, or Thymol 1, Petroleum Oil 18, used as pigments in ringworm of the scalp—whilst acting as parasiticides they dissolve the fat, loosen the hairs and thus help epilation. $2\frac{1}{2}$ to 5% in a mixture of chloroform and olive oil also used.

Sapo Thymol St. G. H.

Thymol 5, Soft Soap 240, Alcohol to 480.

Thymaglycine (*Martindale*). *Dose per os.*—10 to 30 minims (**0·6 to 2 Cc.**).

A palatable preparation containing Sodium Benzoate, Glycerin, Menthol, Essential Oils, and Thymol Water.

As such, or diluted, is beneficial in rhinitis, pharyngitis, quinsy, to brush the gums, and in gastric and intestinal catarrh.

For spraying into the throat and nostrils, may be diluted 1 to 3 with water. For **vaginal irrigation** dilute with 20 times its volume of warm water. Colitis is treated with an irrigation diluted 1 in 6.

To ward off colds douche the nose with Thymaglycine as such or diluted 1 to 3 of water. In measles the necessity of wiping out the mouth with a preparation of this kind is often forgotten.

As a preventive against microbic infection—it is most important to wash the nasal mucous membrane and the throat (tonsils in particular) with an antiseptic lotion.

Colitis in children. 5 to 10 drops in paraffin or water well tolerated and effectual. It also acts well against threadworms and has been found of great value in whooping cough.

***Glycothymoline** (T.M. 231933). Said to consist of Potassium Carbonate Sodium Benzoate, Sodium Borate, smaller portions of Sodium Salicylate Thymol, Menthol, Glycerin and Alcohol, coloured with Cochineal. Employe in catarrhal conditions of the mucous membrane of the nose, throat, stomach intestine, uterus and vagina.

Spiritus Thymol. *Dose.*—3 to 15 minims (**0·2 to 1 Cc.**).

Thymol 1, Alcohol (90%) to 10 ; for medicating the wool of respirators. In scabies, where the infection is limited and recent, this solution is suitable for short applications.

Volckmann's Thymol Solution.

Thymol 1, Alcohol 20, Glycerin 20. Dissolve and add to water 1,000. Used as a spray and antiseptic lotion, as for burns.

Unguentum Thymol.

L. H. has 20 grains to the ounce of Soft Paraffin. *Dissolved by heat.* Applied half strength to the skin, keeps off gnats, etc. Used in the later stages of eczema and for other skin affections.

Unguentum Thymolis Compositum St. Th. H.

Thymol 5, Boric Acid 30, Zinc Oleate 60, Hydrous Wool Fat 120 Yellow Soft Paraffin to 437·5.

Vapor Thymol, T·H.

Thymol 6 grains, Alcohol 90% 1 drachm, Light Magnesium Carbonate 3 grains, Water to 1 ounce. A teaspoonful to a pint of water at 140° F. for inhalation. Stimulant and antiseptic.

Thymol Carbonate.—*Syn.* **Thymotal.**

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

A nearly tasteless, colourless, crystalline powder not dissolved in the stomach. Employed in ankylostomiasis. May prove useful against tænia and other worms. **Tablets** contain 10 grains.

Thymoform Tablets. *Dose.*—One occasionally.

Contain Thymol and Formic Aldehyde in a Cane Sugar basis as an antiseptic throat lozenge.

TINCTURÆ.

Tinctures are made by *percolating* the drug in more or less fine powder with the menstruum (usually alcohol) in a percolator, or by *macerating* in a closed vessel for a time with shaking or stirring.

We proved that in many cases a few hours' maceration was effective as the customary 'seven days' or more. Compare our findings in respect of Digitalis Tincture, p. 390.

Non-Alcoholic, 'GLYCERIN,' or 'AQUEOUS' **Tinctures.**

Some of these are in occasional demand, but the alkaloidal ones can have little activity, unless a suitable acid can be used to ensure their solution. The **Glycetracta,** with which we have experimented, should replace them.

Ethereal Tinctures of certain drugs are made, *e.g.*, Belladonna, Capsicum, Iodine and Menthol.

For the **dispensing of resinous tinctures** in mixtures, **Mucilage of Acacia** yields satisfactory mixtures with most Tinctures except in the case of Tinct. Benzoini Co., Jalapæ, Myrrhæ, and Tolu. The Mucilage is best diluted with as much water as possible, and the tincture then added.

If **Salts** be present in the mixture the above rule applies, except i

the case of Cannabis, where Tragacanth Mucilage should be used. Tincture Podophylli requires no suspending agent in the absence of salts, but if any be present Mucilage of Acacia is best used.

Tragacanth Mucilage answers well for suspending Tinct. Jalapæ and Tinct. Myrrhæ, but is useless for Tinct. Benzoini Co., Quininæ and Tolu. For Tinct. Benzoini Co. and Tinct. Tolu, the two mucilages combined are best. In the case of a mixture containing 1 drachm of resinous tincture to the ounce, dilute 1 drachm of Mucilage of Acacia with as much water as possible, add the tincture, and lastly add the Mucilage of Tragacanth.

Tinctura Hydrastis, which in absence of salts requires no suspending agent, should have an addition of Mucilage of Tragacanth if salts be present. Tinctura Lupuli and Tinctura Cimicifugæ require no addition either in presence or absence of salts.

Total solids and ash from a number of Tinctures.—P.J. ii./07,738. See also J. R. Walmsley, P.J. ii./29,459.

Various Alcoholic strengths used in making Tinctures and their relative advantages.—A Dutch communication, P.J. ii./26,36.

TRAGACANTHA.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) or more.

From *Astragalus gummifer* and some other species (*Leguminosæ*).

Gelanthum (**Unna's Jelly**).

Heat in a steam bath Tragacanth 110 grains, Gum Acacia 30 grains, Gelatin 120 grains, and Distilled Water 10 ounces, for 4 hours; press the paste through muslin, mix well and add Glycerin 6 drachms, heat again in a water bath for an hour, and add Thymol Water *q.s.* to 12 ounces.—Ph. Form. modified. This is similar to the formula in E.L. A basis for various antiseptic applications for skin medication.

Glycerin of Tragacanth (*B.P.* '14).

Tragacanth, in powder, 1, Glycerin 3. Mix, and add Water 1. Useful pill excipient.

'Cremor-Sicc.' Preparations.—Desiccating Creams for application to the skin. A small portion rubbed on the part in a thin layer rapidly dries and forms a protective coating. The following medicaments can be incorporated in the basis:—

Adrenalin 0·1%, **Alum Acetate** 5%, **Argyrol** 2%, **Boric Acid** 5%, **B. Naphthol** 5%, **Cade Oil** 10%, **Capsicin** 2%, **Chrysarobin** 5%, **Cicatricine** 10%, **Cocaine** 2%, **Collargol** 2%, **Formosyl** 10%, **Ichthyol** 5 and 10%, **Ichthyol-Resorcin** 5%, **Iodoform** 5%, **Lactic Acid** 5%, **Liquor Carbonis Detergens** 5%, **Menthol** 5%, **Mercuric Chloride** 1 in 5,000, **Phenol** 2%, **Resorcin** 2 and 5%, **Salicylic Acid** 2 and 5%, **Sulphur** 10%, **Thymol** 0·1%.

The basis contains 25% of **Zinc Oxide.**

Cremor Emolliens. *Syn.* SKIN CREAM, U.C.H.

Tragacanth 1, Methylated Spirit 7, Glycerin 14, Olive Oil 3½, Simple Tincture of Benzoin 2, Water to 100.

Mucilago Tragacanthæ (*B.P.* '14).

Dose.—1 drachm to 1 ounce (**4 to 30 Cc.**) or more.

Improved formula suggested by the writer:—

Pour Alcohol (90%) or Spirit of Chloroform 120 minims into a 20-ounce dry bottle and add Tragacanth, in powder, 60 grains. Shake till evenly moistened

and add Distilled Water *q.s.* to 10 ounces. Shake again quickly to make a uniform mucilage. This keeps much better than mucilage of acacia. One part to 3 of aqueous fluid will suspend heavy powders. *Vide* also Resinous Tinctures *antea*.

U.S. X. directs Tragacanth 6, Glycerin 18, Water to 100.

Mucilago Marantæ. *Dose.—Ad lib.*

Triturate Arrowroot 6 drachms with water 2 ounces to make a smooth paste and make up with boiling water to 1 pint. Heat until semi-transparent. Cool and add spirit of chloroform 2 drachms.

To suspend Bismuth and other suitable heavy medicaments this and a similar preparation of cornflour has been found useful. It will suspend bismuth salts in a proportion as high as 1 drachm to the ounce.—Cpl. Cattel.

Pulvis Tragacanthæ Compositus (*B.P.* '14).

A mixture of Tragacanth, Gum Acacia, Starch, and Sugar.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**). Is used as last preparation, 10 grains to 1 oz., specially useful for bismuth oxynitrate.

TRITURATIONS, U.S.

Diluted powders of active substances made with Milk Sugar *1 in 10.* *Vide* Index for Triturations prepared and their doses.

Levigations are of strength *1 in 50*:—

ℙ 1	Levigatio Aconitinæ (base)	..	..	*Dose* $\frac{1}{5}$	to $\frac{5}{6}$	grains.
ℙ 1	Levigatio Hyoscinæ Hydrobromidi	..	,,	$\frac{1}{4}$,,	$\frac{1}{2}$	,,
ℙ 1	Levigatio Hyoscyaminæ (base)	..	..	,, $\frac{1}{2}$,,	1	,,

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TROCHISCI.

Lozenges are prepared with six different flavourings (*B.P.*'14). Those with **Fruit Basis** are prepared with Black Currant paste, Sugar and Tragacanth, but are harder than the Fruit Lozenges of commerce—viz., Benzoic Acid ($\frac{1}{2}$ grain), Catechu (1 grain), Eucalyptus Gum (1 grain), Guaiacum Resin (3 grains), Extract of Krameria (1 grain), and ℙ 1 Extract of Krameria (1 grain), combined with Cocaine Hydrochloride ($\frac{1}{20}$ grain).

Simple Basis.—Sugar 496, Gum Acacia 19½, Mucilage 35, Water *q.s.* Used in—Ipecacuanha ($\frac{1}{4}$ grain), Reduced Iron (1 grain) and Santonin (1 grain).

Rose Basis is as above, but with addition of Otto. Used in—Compound Bismuth Carbonate (2 grains), Potassium Chlorate (3 grains) and Sodium Bicarbonate (3 grains)—the last mentioned not *B.P.* '14.

Tolu Basis contains Tolu Tincture 10, Water 10, Sugar 482, Gum Acacia 19, Mucilage 35½, Water *q.s.* Used in Acid Tannic ($\frac{1}{2}$ grain), Phenol (Carbolic Acid) (1 grain), (*B.P.*, '98) Ⓟ Morphine Hydrochloride ($\frac{1}{32}$ grain) and Ⓟ Morphine Hydrochloride ($\frac{1}{32}$ grain), with Ipecacuanha ($\frac{1}{10}$ grain).

Orange (Tincture) is used to flavour Sulphur Lozenges (5 grains).

Lemon Juice with Sugar, Acacia and Tragacanth is used for Phenol Lozenges (*B.P.* '14) ($\frac{1}{2}$ grain).

In the index those with 'R' have Rose basis; 'S' have Simple Sugar basis; 'T' have Tolu basis; 'G' have Gelatin basis, and are the commonly sold **Pastils** or **Jujubes** of oval or round shape (the latter are frequently "sugared"). *Vide* also **Pastilli Glycogelatin.**

UNGUENTA.

The principal **Ointment Bases** are:—**Lard, Benzoated Lard,** and **Lard** with **Oleic Acid** (for Alkaloids); **Paraffin, Soft** (**White** or **Yellow**), and **Hard Paraffin**, and their combination **Paraffin Ointment** (**White** or **Yellow**); and **Wool Fat** (and **Hydrous**). **Almond Oil, Beeswax** (**Yellow** and **White**), **Camphor, Glycerin, Olive Oil, Spermaceti, Prepared** and **Benzoated Suet, Palm Oil, Cocoanut Oil** and **Sodium Stearate** are also used.

Unguentum Simplex (*B.P.*, 1885) was composed of White Wax 2, Benzoated Lard 3, Almond Oil 3.

Goose Grease is readily absorbed (*cf.* Anserine Mulls).

Lard and Olive Oil are absorbed to the extent of about 15% after two minutes rubbing. Hydrous Wool Fat is absorbed 20% providing the proper amount of water is present. Olive Oil assists.

A basis of **Hydrous Wool Fat and Glycerin of Starch** is largely absorbed. It is relatively non-greasy.

Lassar's Paste (*q.v.*) forms an excellent *Protective Ointment*, as also does a mixture of Hydrous Wool Fat 1 with Soft Paraffin 3.

✱**Eucerin** (T.M. 297268, 297270) **Anhydrous.**—A mixture of 5 parts of Oxycholesterins from Wool Fat with 95 Paraffin Ointment. This with an equal quantity of Water gives 'Eucerin Purum' miscible with other salves, etc.—Gehe.

For other ointment bases cf. Crembas, Adeps Lanæ, Mulls, Mollin, etc.

UREA.

$CO(NH_2)_2 = 60{\cdot}0472$. *Syn.* CARBAMIDE.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**), thrice daily, may be given in a mixture flavoured with lemon syrup, but much larger doses are commonly now given both in therapy and as diagnostic. Hypodermically a 1 in 6 solution has been given, but it is seldom used that way. It forms colourless crystals.

Soluble 1 in 1 of water and in alcohol 90% about 1 in 7½.

Urea is synthesised by acting on Phenyl Carbonate [$CO(O.C_6H_5)_2 = 214{\cdot}078$] with Ammonia, the products of the reaction being Urea and Phenol. (Phenyl Carbonate is made by passing Phosgene, *i.e.*, Carbonyl Chloride, $COCl_2 = 98{\cdot}914$, into dilute Sodium Phenate solution.) Wohler in the year 1828 succeeded in converting Ammonium Cyanate into Urea; it was the first animal product made by a purely chemical synthesis.

E. Werner holds that Urea is of the formula $H_3N{<}\overset{O}{\underset{C:NH}{}}$

This brings it into relation with Ammonium Salts in general, and makes Cyanic Acid the most significant decomposition product. Urea is omnipresent, even in the lowest forms of plant life.—B.M.J. i./23,1020.

Carbonyl Chloride is available in cylinders. It was one of the early (and most dangerous) gases used in the war. The treatment was venesection, which was sometimes effectual. Warmth and stimulants are required at the same time.

Urea may also be obtained from Calcium Cyanamide by hydroly sing with 10% H_2SO_4 at 50° C.—P.J. i./16,45.

Uses.—Urea has diuretic properties and is given to some extent in gout and kidney disease. In the past it was given in phthisis.

It has marked bactericidal properties and has been suggested for use to wounds. For the estimation of urea in urine *see Vol. II.*

Grave genuine NEPHROSIS (nephritis with œdema, without hypertension or hematuria). Complete recovery under treatment with Urea up to 100 Gm. daily.—D.M.W., Nov. 13, '25, per Jl. A.M.A. ii./25,2058.

A useful diuretic in doses of 30 to 60 Gm. a day in a small amount of water after meals in cases of heart failure with œdema.—Arch. Int. Med., Oct. 15, '25, per Jl. A.M.A. ii./25,1753. *See also* B.M.J.E. i./26,2.

After ingestion of 100 Gm. Urea by normal persons the Urea-Nitrogen of the blood can be raised to a figure comparable with that obtained in chronic nephritis. When blood Urea exceeds 70 mg. per 100 Cc., headache, dizziness and somnolence may occur. It can be given over long periods and has been administered in doses above mentioned in advanced cardiac decomposition. With continuous administration, daily urine volume can be maintained at almost constant level. Its use as a diuretic deserves greater popularity.—Jl. A.M.A. ii./25,2036.

SCAR TISSUE.—Best results in softening of, obtained by injection under non-adherent scars of a concentrated solution of Urea. Care necessary as necrosis caused when injected under an adherent scar.—Per Pr., April, '26,332

Haustus Ureæ Composita. (**Urea Concentration Test**). **K.C.H.**

Dose.—3½ ounces (**100 Cc.**), less for children.

Urea 4½ drachms, Tincture of Orange 15 minims, Water to 3½ ounces.

Thio-Urea. *Syn.* **Thiocarbamide** $CS(NH_2)_2$=76·1072. Obtained by heating dry Ammonium Sulphocyanide in an enamelled vessel to 170° C. for an hour, then cool rapidly and extract the unaltered Sulphocyanide with cold, strong Alcohol and crystallise the residue repeatedly from hot water. Crystals soluble 1 in 10 in water—with difficulty in Alcohol.

℗1 **Ureides.**—The designation in the Poisons Schedule is ***"All Poisonous Ureides."*** A Ureide is a compound of an Acyl (or Acidyl) radical with the residue of Urea thus :—

$NH_2CO.NH_2$ Urea. $NH_2CO.NH.CO.CH_3$ Ureide of Acetic Acid.

Analogous are the Amides to Ammonia :—

NH_3 Ammonia. $NH_2.CO.CH_3$ Amide of Acetic Acid.

When the Acyl radical is from a dibasic acid one H atom of each NH_2 may be replaced as in Barbituric Acid. $CO<^{NH—CO}_{NH—CO}>CH_2$

These are **Cyclic Ureides.** Some held that only these are involved. **Adalin** and **Bromural** are Ureides, but not cyclic. *Any Alkyl, Acyl or Metallic Derivative of Barbituric Acid is included, even if proved to be non-poisonous.*

We have reasons to regard Adalin, Bromural and other recent additions to the book as ℗1.

We also take the view that combinations containing a high proportion of Ureides cannot be brought reasonably into the Ⓟ *Admixture Clause. We should welcome an addition to* ℗1 *bringing in* ***'or preparations of Barbiturates in any proportion.'***

The name **Diureide** is usually given to bodies containing *two* urea residues, *e.g.*, Uric Acid and Caffeine.

℗1 **Barbitonum** (*B.P.* '14).—MALONUREA. *Syn.* DIETHYL-MALONYL-UREA. DIETHYL-BARBITURIC ACID, P.G. VI., FR. CX. SUPP. 1920, P. HELV., P. SVEC., P. JAP. IV., Ph. Ned. V., P. Svec. X. BARBITALUM, U.S. X., P. BELG. IV., F.E. VIII., P. ITAL. V. MALONAL. ✱HYPNOGEN (T.M. 279688), DEBA, VERONAL.

Wholesale and retail vendors must treat as ℗1.

$(C_2H_5)_2 : C : (CO.HN)_2 : CO$ or $C_8H_{12}N_2O_3$=184·1096.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**)—should be dissolved in

hot water. *Bowels should be kept open and the kidneys in good working order.* P.G. VI. Max. single dose **0·75 Gm.** max., per diem **1·5 Gm.**; Fr. Cx. Supp., P. Belg. IV. and F.E. VIII. **0·5** and **1 Gm.** respectively. P. Ital. V., **1** and **2 Gm.** respectively.

Caution.—5 grains are sufficient for an ordinary case of insomnia. The symptoms of poisoning are—somnolence, unconsciousness, subsequently coma, cyanosis and cold extremities. 50 grains might be regarded as the average minimum fatal dose.

Antidotes.—Stomach pump, lavage and enemata. Coffee, Strychnine, later diuretics.

Manufactured by condensing Urea with the Diethyl ester of Malonic Acid. Malonic Acid is $CH_2(COOH)_2$. No longer a British Patent. *Vide, e.g.*, 1664/1903, 14,014/1904.

Details may be found in—J. B. Cohen, Practical Organic Chem. *See also* our Edn. XVIII, p. 790.

A white crystalline powder melting at 191° C. (U.S. 187 to 190°), ***Soluble*** 1 in 145 water at 20° C., and about 1 in 9 of alcohol 90%, more soluble in hot water, and in alkaline solutions. *Boiling* with alkalis decomposes it. In Ether, 1 in 25. It is also soluble in Acetone and Acetic Ether. In Chloroform 1 in 35—by our experiments.

Pharmacology.—No tolerance developed in cats after long continued administration of hypnotic doses. Cumulative effect developed during first few days, but disappeared later with continuance of dose—due to absorption initially lagging behind excretion.—N. B. Eddy, Jl. Ph. & Exp. Ther., Nov.,'29,271,282.

Uses.—Soporific in nervous restlessness, insomnia and depression, for maniacs and in cardiac trouble. Does not affect temperature or respiration. May cause erythema. Produces sleep without subsequent depression. Tolerance to it may be established in some cases. *See*, however, *Pharmacology, supra.*

℞ **Malonurea Tablets**, 5, 8 or 10 grains, or in Cachets. (*Caution* : for dose *v. antea*).

℞ **Suppositories** 4 to 8 grains (**0·25 to 0·5 Gm.**).

Treatment of acute Veronal Poisoning. If *within* 4 *hours* of taking the drug, repeated lavage of the stomach with warm water, then introduce through the stomach tube a pint of hot strong coffee with some milk in it and an ounce of Castor Oil.

If patient is seen 6 *hours or so after taking the drug* the poison has passed into the intestine, but rapid washing out of the stomach and giving coffee may still be advised, unless patient is *in extremis.* Other measures—cardiac stimulants (Strychnine 1/30 grain with Digitalin 1/100 grain every 4 hours) warm Normal Saline subcutaneously, rectal injection of 15 oz. of Normal Saline containing 4% Glucose. If much cyanosis Oxygen. If pulse feeble Oxygen should be passed through a wash bottle of Absolute Alcohol. If urine is not freely excreted give Caffeine hypodermically. The coma may last several days—feed, therefore, with warm milk and coffee every 4 hours—by stomach or nasal tube carefully passed. —Sir W. H. Willcox, L. ii./13,1178; Int. Cong. Med., Aug., 1913.

Tests and Toxicological Analysis in case of Veronal Poisoning.—See Vol. II.; Org. Anal. Chart and Corroborative Tests.

Poisoning Effects.

A case of gangrene of the skin following a large dose of Veronal and Pyra midon.—L. ii./11,479.

Hemiplegia caused by Veronal in aged persons.—B.M.J. ii./10,375.

Veronal has the peculiar property of counteracting unpleasant effect o morphine.—L. ii./08,1223.

Veronal owes activity to Ethyl groupings—this body is more powerful than the corresponding Methyl Compound, whilst Proponal (*v.p.* 810) possesses th maximum activity in the group.—B.M.J. i./09,554.

Review of hypnotic drugs, Chloral bodies, Sulphone Compounds, Ureides and other bodies with allied effects.—Sir W. H. Willcox, B.M.J. ii./13,661.

Veronal 92½ grains taken with poisoning symptoms by a retired prize fighter. Recovery. Treatment hypodermically Strychnine and Digitalin stomach pump, lavage with weak Sodium Bicarbonate (tube passed wit difficulty after warming and oiling it). Half pint strong black coffee an 2 ozs. brandy passed in, later hypodermic injections of Camphor Linimen (20 minim injections) every ¼ hour (latter valuable—keeps the heart going an overdose is impossible) and more Strychnine.—B.M.J. i./13,280.

Another case, non-fatal after taking 125 grains in one dose, according to th patient. Treatment, lavage with dilute Permanganate; Atropine Sulphat 1/50th grain hypodermically repeated twice within two hours. The stomac washing was probably useless as absorption had presumably already occurre yet he returned to consciousness after four days.—B.M.J. ii./13,20.

Veronal (and Luminal) RASHES.—Veronal should not be used in skin case especially of the bulbous type. Erythematous rash (in some areas it wa sheet-like as result of coalescence) after Luminal, 3 grains a day.—G. Perne B.M.J. ii./13,312.

Rash following administration of 10 grains of Medinal every night fo 3 nights.—P. W. Mathew, B.M.J. i./26,323.

Veronal poisoning—fatal case. Recovery of the drug from tissues an urine.—B.M.J. i./14,853. A case of recovery from 125 grains *ibid.* 854, an after 35 grains *ibid.* 856, and after 100 grains *ibid.* 1015.

For other cases see Edn. XVIII, p. 792.

Medinal poisoning, a case. Cumulative toxic effect same as Veronal.— L. i./26,391.

Recovery after taking as a single dose about 200 grains of Veronal. Com plete unconsciousness lasted 113 hours and there were other grave symptom —S. M. Wells, B.M.J. ii./27,826.

Death from probably 50 grains of Veronal taken for sleeplessness in th belief by the victim that he could take more than most people.—A. Dean B.M.J. ii./27,192.

Veronal is excreted slowly and unchanged in the urine: in cases of poisoni increase the efficiency of the kidneys by injection of ***large volumes o 5% to 10% Dextrose*** solution. A woman who had taken 60 grains w given 1½ litres 5% Dextrose 4 hours later. In 6 hours she passed 1,100 C urine, and 11 hours later showed no symptoms of the drug.—Am. Jl. P Oct., '30,599.

Dangers of the Barbituric Hypnotics.

Speaking generally, the Veronal derivatives are on the whole more powerf and therefore more potentially dangerous, than Veronal itself, but a confus nomenclature makes it possible that a doctor who has found Veronal unsat factory, may turn to an alternative drug, and only learn by bitter experien that it is the same thing under a new name.—B.M.J. i./25,128.

Reasons of Veronal poisoning—its potency, no evidence of habit, delay action, and that in every case of death the victim has tried to procure immedia sleep.—G. Archdall Reid, B.M.J. i./25,630.

In patients with any cardio-renal affection, Veronal and other hypnot must be given with caution, as their excretion must be necessarily delayed. case mentioned in which there was ophthalmoplegia as well as coma af taking 14 grains.—E. P. Scott, L. i./25,658.

Discussion on Barbituric derivatives and allied hypnotics.—G. Malco Dyson, P.J. i./26,385.

Medinal found innocuous in medicinal doses and stated to be rapidl absorbed and eliminated.—L. i./26,464.

The average dose of Veronal in fatal cases has been 50 grains. As little as 10 grains has caused death. The group is apt to produce signs of organic paralysis, albuminuria may occur, and a common occurrence with an overdose is the development of broncho-pneumonia. Veronal taken every night is liable to produce mental and moral changes with suicidal tendencies, also diplopia with visual paralysis and the kind of speech found in G.P.I.: a characteristic feature of Luminal is hæmatoporphyrinuria. Continued administration of these drugs ***produces pathological changes*** in the ***central nervous system,*** which, although they usually disappear when dose is discontinued, may become permanent. The resemblance between the comatose condition produced by them and the condition of normal sleep is only superficial and under these drugs the margin between sleep and fatal coma in cats is a very narrow one. There is definite ***evidence of cumulative action,*** and tolerance is never established. Danger not properly recognised: should be ordered only on prescription marked ***'Not to be repeated,' and covering only 6 doses.*** Patients should be warned against daily doses and should receive ***only one each week.*** Warning to practitioners *re* glowing advertisements, which are seriously misleading to the profession and a grave danger to the public.—Sir Wm. H. Willcox, B.M.J. i./27,877; L. i./27,1037.

No addiction or ill-effects observed with Medinal.—M. Craig, B.M.J. i./27,983; *see also ibid.* 1031,1083, and especially 1125 and 1163.

In *therapeutic* doses these drugs may have no toxic effect on metabolism and no cumulative action.—C. Worster-Drought, L. ii./27,768.

Barbituric preparations are dangerous not only when taken in big doses, but in small doses frequently repeated, causing definite hepatic insufficiency.—Carteaud, Jl. A.M.A. i./29,662.

Chemists in Constantinople doing nothing but ***search for new substances*** which would have the ***same effect as the Veronal group.***—Poisons & Pharmacy Bill, Committee Stage in the Lords', B.M.J. i./31,608.

℗1 **Veronal-Sodium.** *Syn.* Barbitalum Solubile U.S. X., Ph. Ned V. ✱Medinal (T.M. 304403). P.G. VI., P. Svec. X., P. Ital. V. Graphically it may be represented thus :—

$$\begin{matrix} C_2H_5 \\ C_2H_5 \end{matrix}\!\!>\!C\!<\!\begin{matrix} CO.N \\ CO.NH \end{matrix}\!\!>\!CONa = 206{\cdot}0988.$$

Dose.—5 to 10 grains dissolved in water either before or not less than one hour after meals. In most cases 5 grains is sufficient for an adult. P.G. VI. has max. single dose 12 grains (**0·75 Gm.**) approx. (*i.e.*, the same as for Veronal).

Wholesale and retail vendors must label "Poison" and treat otherwise as ℗1.

Patent 19,411/1904 and 2566/1905 became void in 1913.

Manufacture.—Rub down Diethylbarbituric Acid 184 Gm. in a mortar with about 200 Cc. of water and then add Sodium Hydroxide pure 40 Gm. previously dissolved in water *q.s.* and *estimated.* It should be as free from CO_2 as possible. Evaporate to dryness on water bath. It may be regarded as an acid salt. If a proportion of alkali sufficient to make the Di-Sodium body is used, decomposition sets in on drying.

White crystals soluble 1 in 5 in cold water. It has properties and uses similar to Veronal *antea.* It is useful in sea-sickness.

Incompatible with Ammonium salts, *e.g.*, the Bromide, and with acids. And with Chloral Hydrate.—P.J. i./31,503. In preference, give it alone.

Solutions of Medinal decompose on heating, forming crystals of Di-acetyl-urea.—per P.J. i./28,521.

℗ **Veronal-Sodium Tablets** are made, 1, 2½ and 5 grains (**0·06, 0·15** and **0·3 Gm.**).

Hypnotic effect is also obtained by the use of **Suppositories** medicated with **0·4—0·5 Gm.**

Even small doses, *e.g.*, 1 grain three times a day, in some instances, produce a lengthy sleep—at night.

It is stated that toxic signs do not appear with less than 15 grains daily, whilst an adequate sedative effect at the menopause is obtained with 1 to 2 grains three times a day, half an hour after meals.—J. H. Hannan, Pr., Oct., '27,263.

Sea-sickness. Veronal 8 grains or Sodium-Veronal which acts faster, taken on board, is valuable.—T. Zangger, L. ii./21,630.

Pharmacology.

Magnesium Chloride 2 parts combined with Sodium Barbital 1 part hastens onset and lessens persistence of narcosis without appreciably increasing toxicity.—H. G. Barbour and W. F. Taylor, Jl. Pharm. & Exp. Therap., July, '31,331.

Animal experiments show that fear and excitement definitely diminish the soporific action of Medinal.—P.J. i./25,444.

℗ ✱**Veronigen** (T.M. 374804). *Dose.*—1 drachm (**4 Cc.**) diluted about one hour before going to bed. For nervous sleeplessness in children 10 to 20 minims diluted. A liquid preparation of Veronal as hypnotic.

℗ **Neurinase.** *Dose.*—(As hypnotic or sedative) 1 drachm (**4 Cc.**) in the morning and 1 to 4 drachms (**4 to 15 Cc.**) at bedtime. 1 drachm contains 2½ grains approximately (0·15 Gm.) of Veronal.

A preparation of Veronal with Valerian, suggested for use in nervous insomnia and neurasthenia.

ℙ 1 **Chineonal** is QUININE DIETHYL-BARBITURATE.

Dose.—10 grains (**0·6 Gm.**) for adults, in fevers, neuralgia, etc.

ℙ 1 ✱**Planadalin** (T.M. 409581). *Syn.* CARBROMALUM U.S X. and F.E. VIII., URADAL, BROMODIETHYL-ACETYL-UREA, ADALIN, Ph. Ned. V., P.G. VI. (no dose), P. Svec. X., NYCTAL.

$$(C_2H_5)_2C<^{Br.}_{CO.NH.CO.NH_2} = 237{\cdot}0334.$$

We consider it safest to regard this a ℙ 1 Poison, though it is an open-chain compound and not a derivative of Barbituric Acid—see also p. 806. A further note is given in Edn. XVIII., p. 793.

PATENT 2333/1910 expired. 'Adalin' is no longer on the T.M. Register.

Dose.—As sedative 5 to 10 grains (**0·3 to 0·6 Gm.**) *t.d.s.*; as hypnotic 10 to 15 grains (**0·6 to 1·0 Gm.**) followed by hot drink half an hour before bedtime. F.E states 0·25 to 0·5 Gm. P. Belg. states max. single dose 1·5 Gm. and *p.d.* 3 Gm. Tablets, 5 grains each.

Tasteless crystalline powder. M.pt. 115°—116° C. Soluble 1 in 5,000 in water. A hypnotic of medium strength. The cyclic structure of the urea derivative of Diethyl Malonic Acid (Veronal) according to E. Fischer makes it a much more powerful hypnotic than Diethyl Acetic Acid, of which Adalin may be looked upon as a derivative.—B.M.J. ii./13,48.

Much less toxic than the allied compounds.—Sir W. H. Willcox, B.M.J. ii./27,1141.

ℙ 1 **Proponal.** *Syn.* DIPROPYL-BARBITURIC ACID.

$$(C_3H_7)_2C(CO.NH)_2CO = 212{\cdot}1408.$$

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). ℙ 1 **Tablets 1½ grains.**

Wholesale and retail vendors must label "Poison" and treat otherwise as ℙ 1.

Manufacture.—Probably made under the Veronal patents (expired) but no licence was registered at the British Patent Office.—C. D.

A homologue of Veronal in white crystalline powder, as hypnotic,

very slightly soluble in water, more so in Alcohol. It is readily dissolved by alkalis—hence probably acts on reaching the intestine.

Very narrow margin between therapeutic and toxic dose. *Whilst 5 to 6 grains are hypnotic, 7½ grains approximate danger zone.*

More poisonous than Veronal.—Sir W. H. Willcox, L. ii./13,1180.

℗ ✱**Soneryl** (T.M. 432474). *Syn.* NEONAL. BUTYL-ETHYL-BARBITURIC ACID.

$$\begin{matrix} C_4H_9 \\ C_2H_5 \end{matrix}\!\!>\!C\!<\!\!\begin{matrix} CO—NH \\ CO—NH \end{matrix}\!\!>\!CO = 212{\cdot}1408.$$

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) produces sleep in half an hour, in addition, there is marked analgesic effect on pain. It may be given at any time, but in no case less than ½ hour after food. A larger dose, *e.g.*, 3 grains (**0·2 Gm.**) gives a deep sleep lasting some time. In pain from wounds 3 to 4 grains may be used. In delirium 2 grains. *Max.* in 24 hours, 4 grains.

℗ **Soneryl Tablets** 1 grain are made.

A white, crystalline powder with slight bitter taste. Soluble 1 in 200 of water. Said to be three times as active an hypnotic as Veronal.

For *rectal use* **Suppositories** 0·1 Gm. *Subcutaneously*, a **Piperazine** compound, containing 0·05 Gm. (of the compound) in each Cc. is used. *Intravenously*, 0·1 Gm. in 20 Cc. of Normal Saline.

It has not the toxicity of Morphine and is not habit-forming.—P.J. i./23,170.

℗ **Nembutal.** *Syn.* PENTOBARBITAL SODIUM, SODIUM *iso*-AMYTAL; SODIUM ETHYL-METHYL-BUTYL-BARBITURATE.

The acidic substance has the composition:

$$\begin{matrix} CH_3.CH_2.CH_2(CH_3)CH \\ C_2H_5 \end{matrix}\!\!>\!C\!<\!\!\begin{matrix} CO.NH \\ CO.NH \end{matrix}\!\!>\!CO = 226{\cdot}1564.$$

The Sodium Salt may be indicated thus:

$$\begin{matrix} C_5H_{11} \\ C_2H_5 \end{matrix}\!\!>\!C\!<\!\!\begin{matrix} CO.N \\ CO.NH \end{matrix}\!\!>\!CONa. = 248{\cdot}1456.$$

A white, crystalline powder, with slightly bitter taste. Very soluble in water, freely in Alcohol, practically insoluble in Ether. Aqueous solutions are alkaline to litmus.

Dose.—1½ grain capsules *per os* and *per rectum*. For intravenous use ampoules of 7½ grains to be dissolved at the time of use in 10 Cc. of water, and injected at the rate of 1 Cc. per minute 10 minutes before operation, the amount given being determined by the effect. 1/100 grain Atropine is given ½ hour before operation, and in adults 1/6 to ¼ grain Morphine. When the oral or rectal route is used the hypodermic injection is given at the same time as the Nembutal capsule.

Uses.—A 'basal hypnotic,' the supplementary anæsthetic being Nitrous Oxide and Oxygen, with addition of Ether when necessary. The sedative effect continues for 1 to 5 hours after operation. Intravenous injection bridges the gap between consciousness and unconsciousness before general anæsthesia, it also lessens the amount of anæsthetic required, diminishes or obviates post-operative nausea. The chief disadvantage is post-operative restlessness in about 10% of cases.—I. W. Magill, L. i./31,74.

Order of hypnotic efficiency (in conjunction with Nitrous Oxide)—Nembutal, Avertin, Phanodorm, Pernocton. Avertin safest, but efficiency decreased owing to short duration of narcosis.—O. W. Barlow and co-workers, Jl. Pharm. and Exp. Therap., April, '31,377.

Placed in the following order of merit as basal hypnotics—Nembutal, Sodium Amytal and Pernocton. Nembutal the most outstanding anæsthetic

drug to date.—I. W. Magill, L. i./31,353. Many fatal cases of poisoning seen from Barbiturates: beyond a certain point cases were hopeless. Luminal very dangerous.—Sir W. Willcox, *ibid.* 354.

Nembutal '844' suitable for preliminary medication in anæsthesia. Intravenous injections must be made fresh. Undesirable to boil.—B.M.J. i./31,359.

As basal pre-anæsthetic hypnotic Nembutal intravenously in 108 cases—better than Amytal or Pernocton. Effect can be increased by giving Morphine simultaneously.—S. Rowbotham, L. i./31,439.

CHILDBIRTH.—Combined oral use of Nembutal and Chloral Hydrate gave 62% of painless labours in 60 cases without ill-effects to mother or children. Initial dose (when *os uteri* is two-fifths dilated and regular pains present) Nembutal 3 grains, Chloral Hydrate 30 grains (in 3 ozs. sweetened home-made lemonade). First 'Repeat' dose of 1½ grains and 30 grains respectively after two hours, and subsequent similar doses at 3-hourly intervals, to a total of 7½ and 120 grains in 12 hours. Chloral given 10 minutes after Nembutal to obviate vomiting. *Not* contraindicated in heart disease or albuminuria. May be given by midwives.—J. V. O'Sullivan and W. W. Craner, L. i./32,119.

Picrotoxin, either intravenously, intramuscularly, or subcutaneously an effective ***antidote*** against acute poisoning (Amytal, Pernocton and Nembutal) ***in animals.*** In man probably safe in doses equal to that of Strychnine, symptomatic effects determining further increases. Over-treatment, resulting in convulsions, corrected by small dose of the Barbiturate first taken.—H. Maloney and co-workers, Jl. Pharm. & Exp. Therap., April 31, 480.

℗1 ***Amytal** (T.M. 506448). *Syn.* *Iso*-AMYL-ETHYL-BARBITURIC ACID.

$$(CH_3)_2CH.CH_2.CH_2 \begin{matrix} C_2H_5 \\ \end{matrix} > C < \begin{matrix} CO.NH \\ CO.NH \end{matrix} > CO = 226{\cdot}1564.$$

A white, crystalline powder, with slightly bitter taste; soluble in Alcohol and Ether; very slightly in water; insoluble in Paraffin Hydrocarbons. M.pt. 153–155° C. Saturated aqueous solutions are acid to litmus.

Dose.—As sedative, ⅓ to ¾ grain (**0·02 to 0·04 Gm.**), twice or thrice daily *per os*, with water or hot milk. As hypnotic, 1½ to 5 grains (**0·1 to 0·3 Gm.**), 1 to 1½ hours before retiring. As local or general anæsthetic, 3 to 10 grains (**0·2 to 0·6 Gm.**) according to age, etc. As anti-spasmodic in tetanus to control convulsions, 6 to 12 grains (**0·4 to 0·8 Gm.**).—N. N. R., Jl. A.M.A. ii./30,1178.

Uses.—A sedative and hypnotic in the control of insomnia and as a preliminary to surgical anæsthesia.

A hypnotic rather than a true anæsthetic. May be combined with spinal anæsthesia.—J. T. Mason and J. E. Baker, L. i./30,1302.

In obstetrics, 30 mgr. per kilo bodyweight per rectum produces effective anæsthesia and amnesia, with little, if any, effect on the baby.—D. L. Drabkin, Jl. A.M.A. ii./29,1175; see also *ibid.* 1339.

℗1 ***Sodium Amytal** (T.M. 506448). *Syn.* SODIUM *Iso*-AMYL-ETHYL-BARBITURIC ACID.

$$(CH_3)_2CH.CH_2.CH_2 \begin{matrix} C_2H_5 \\ \end{matrix} > C < \begin{matrix} CO.N \\ CO.NH \end{matrix} > CONa = 248{\cdot}1456.$$

This Ureide is isomeric with Nembutal. It is a white, friable, hygroscopic, odourless, granular powder with slightly bitter taste; very soluble in water, in Alcohol about 1 in 1, and practically insoluble in Ether.

Dose.—As sedative or hypnotic in capsules containing 3 grains (**0·2 Gm.**), *per os*, repeated if necessary at 6-hour intervals. As a pre-anæsthetic 3 to 10 grains (**0·2 to 0·6 Gm.**)—but only safe for use

in this way by experienced workers familiar with the literature. As antispasmodic in tetanus, 6 to 12 grains (**0·4 to 0·8 Gm.**) to control convulsions.—N. N. R., Jl. A.M.A. ii./30,1178.

It is also given by the following methods :

Rectally.—Not exceeding 15 grains (**1 Gm.**), with a maximum of 1·5 Gm. in 3% aqueous solution, followed immediately by injection of 1 or 2 ounces of water.

Intravenously has been given in dose of 5 to 15 grains (**0·3 to 1 Gm.**) in 10% Solution at rate of 1 Cc. per minute. Blood pressure has to be watched continuously. There are many contraindications. ***Vide criticisms infra.***

Intramuscularly not more than 5 Cc. of 10% solution should be injected at any one point.

Pharmacology.—Average fatal dose orally for dogs 125 mgr. per kilo ; rectally and intravenously in 10% solution, 200 and 70–75 mgr. per kilo respectively.—E. E. Swanson and H. A. Shonle, Jl. Pharm. & Exp. Therap., Feb. '31,305.

Uses.—Primarily, as hypnotic for the pre-anæsthetic preparation of the patient, but not as an anæsthetic agent.

Causes marked drop in blood pressure intravenously. Unconsciousness lasts 3 to 6 hours. Safer *per os* or *per rectum*. In medicine, useful for the control of convulsions in unmanageable cases and as a specific for strychnine poisoning (extensive American bibliography).—L. G. Zerfas, B.M.J. ii./30,897; L. ii./30,693.

Risk of insufficient pulmonary ventilation in period of sleep (24—48 hours) after operation, and a large number require catheterisation.—J. T. Mason and J. E. Baker, Sur. Gynec. & Obstet., May, '30, per L. i./30,1302.

GASTRIC AND DUODENAL ULCER treated. Checks secretion of gastric juice. —L. G. Zerfas, B.M.J. ii./30,527.

LABOUR.—Best procedure in women of average weight 1/8 to 1/6 grain Morphine, 1/150 to 1/200 grain Scopolamine, and 6 to 9 grains Sodium Amytal intramuscularly, when contractions are regular and occurring at less than 10-minute intervals—injections repeated as indicated. Intravenous injections given at beginning of second stage of 6 to 10 grains during several pains, and stopped when patient is well controlled. Rapid in action and has a wide range of safe dosage. No harm to mother and labour not delayed.—A. R. Robbins, Jl. A.M.A. ii./29,1251.

Amytal and Sodium Amytal as analgesics in confinements. 3 grains at first, late in first stage of labour. If necessary, repeat in 4 hours.—L. ii./30,1086.

Sodium Amytal in labour not well spoken of. Morphine and Nitrous Oxide or rectal Avertin in preference.—J. Riddell, L. i./31,162.

℗1 ***Dormigene** (T.M. 367615). *Bromural (T.M. 284555).

Syn. ***α-Brom-iso-Valerianyl Urea.*** P.G. VI., Ph. Ned. V., P. Svec. X., F.E. VIII.

$(CH_3)_2CH.CHBr.CO.NH.CONH_2 = 223·0198$.

We consider it safest to regard this as a ℗1 Poison, though it is an open chain compound and hence not a derivative of Barbituric Acid.

PATENT 942/1907. It may be prepared by condensing the chloride of α-Brom-iso-Valeric Acid with Urea :

$(CH_3)_2CH.CHBrCOCl + (NH_2)_2CO = (CH_3)_2CH.CHBrCO.NH.CO.NH_2 + HCl$

Dose.—**5 to 10 grains (0·3 to 0·6 Gm.).**

Colourless crystals, soluble with difficulty in water, dissolved by Caustic Soda and precipitated by acids from its solution in alkali. M.pt. about 145° C. (by our expts.). Contains about 36% Bromine. Is said to induce sleep which commences in from 5 to 25 minutes after taking and lasts from 4 to 5 hours, at the expiration of which natural sleep follows, the action of the drug having ased in that time.—B.M.J.E. i./07,75.—B.M.J. i./09,554.—L. ii./08,1223.

℗1 **Dormigene Tablets** contain 5 grains (**0·3 Gm.**).

This and Adalin cause a diminution in blood pressure, but are without effect on the heart—experiments on rabbits. Adalin is the more lethal.—J.C.S.A. i./13,1023.

℗1 ✱ **Phanodorm** (T.M. 456641). *Syn.* PHANODORN, CYCLOHEXENYLETHYL BARBITURIC ACID. $C_{12}H_{16}O_3N_2$=236·1408.

Dose.—Average dose 1 tablet (3 grains). In mild insomnia, 1½ grains; obstinate insomnia, 3 to 6 grains. Larger dose not repeated in less than 12 hours.

A white, crystalline powder, with bitter taste; soluble in Alcohol and Ether, only slightly soluble in water.

Uses.—As hypnotic. In nerve affections to be taken in warm water.

℗1 ✱ **Allonal** (T.M. 428271). A combination of Allyl-isopropyl-Barbituric Acid 1 grain and Amidopyrin 1⅔ grains, in tablets.

Dose.—1 to 2 tablets as sedative or hypnotic in simple cases of insomnia; 2 to 4 as analgesic and hypnotic. 'Worked better than Morphine.'—M. A. Burns, N.Y. Med. Jl., April 19, '22.

Two tablets quickly relieve pain in neuralgia, neuritis, rheumatism, sciatica, etc. Is not habit-forming, and has low toxicity. *Not more than 4 tablets daily advised.*

Death following overdose of Allonal. Birmingham Coroner investigated the death of a woman who had taken 10 tablets a day for more than a year. It was stated that the Law was *loosely drafted* to permit of Allonal being treated as a ℗ Poison (Makers state ℗1). Verdict: Death due to misadventure through a self-administered overdose.—P.J. i./32,117. Allonal contains some uncombined Pyramidon, and is regarded as an 'admixture' and a Part II Poison.—H. N. Linstead, *ibid*, 119.

E. C. Bennison, also consulted by the authorities in respect of the case, states that his work showed Allonal to be a molecular combination and to be regarded as ℗1.—P.J. i./32,139.

It is a definite compound with a well-known formula, and no more 'contains' a poison than Prussic Acid does.—R. C. Owen, P.J. i./32,139. It has been marked ℗1 for the last two Editions—since 1924.—W. H. M.

℗1 ✱ **Sedormid** (T.M. 489462). *Syn.* ALLYL-ISOPROPYL-ACETYL-UREA. $C_9H_{16}O_2N_2$=184·1408.

Dose.—4 grains (**0·25 Gm.**) in tablet. As sedative, 1 tablet. As hypnotic, 1 or 2 tablets 20 minutes before retiring.

Slightly soluble in water, tasteless. M.pt. 194° C. Sedative in cardiac neuroses, Graves' disease, disturbances of the climacteric, nervousness and mental diseases. Stated to be rapidly decomposed in the system, avoiding accumulation.

℗ **Somnifen.** (✱SOMNIFAINE is T.M. 453520). A solution of the DIETHYLAMINE SALTS OF ALLYL-ISOPROPYL-BARBITURIC ACID AND VERONAL.

Dose.—2 Cc. intramuscularly deeply. In twilight sleep to be preceded by Morphine ¼ grain and Hyoscine 1/100 grain. Considerable risks are attached. Any improvement only temporary.—W. S. Dawson and M. R. Barkas, L. ii./26,1155.

Intravenously or intramuscularly produces deep sleep lasting a number of hours.—L. ii./26,662.

For surgical anæsthesia 0·01 Gm. per kilo intravenously, never passing 0·07 Gm. It must be combined with Morphine hypodermically.—I. Macdonald, L. i./26,463.

Results too uncertain.—L. i./30,473.

℗1 ✱ **Pernocton** (T.M. 488342). *Syn.* PERNOSTON, SODIUM BUTYL-B-BROMALLYL-BARBITURATE. $C_{11}H_{14}O_3N_2BrNa=325{\cdot}0382$.

Issued in ampoules containing $3\frac{1}{4}$ grains in 2·2 Cc. Average hypnotic dose intravenously 3 Cc. (containing $4\frac{1}{2}$ grains), given at the rate of 1 Cc. per minute.

Resembles Sodium Amytal in action, but is a more powerful hypnotic. In addition, there is less restlessness during recovery period. No fall in blood pressure. The solution is ready for use.—E. I. McKesson and K. C. McCarthy, B.M.J. ii./30,902.

Pernocton advocated.—E. I. McKesson, L. ii./30,797.

Not acceptable in U.S.A. for N.N.R. on the grounds that the name is therapeutically suggestive and lack of critical evidence that routine intravenous injection of potent narcotics is desirable or safe.—Jl. A.M.A. ii./31,1002.

DENTAL WORK.—Pernocton intravenously. A good anæsthetic, conducting operation under Gas and Oxygen through a Magill tube. Nembutal and Avertin also suitable, but no advantage over Pernocton.—R. R. Macintosh, Brit. Dent. Jl., Feb. 15,1932.

℗1 ✱ **Dial.** (T.M. 381421 ✱Dial Ciba, T.M. 358718.) *Syn.* **Diallyl-Barbituric Acid.** P. Svec. X. with max. dose 0·3 Gm.

$$(C_3H_5)_2C{<}\begin{matrix}CO.NH\\CO.NH\end{matrix}{>}CO=226{\cdot}0896.$$

A further homologue of Veronal employed as hypnotic. **Tablets** contain $1\frac{1}{2}$ grains. Dose one half to three tablets in water.

Insomnia well treated by di-allyl-barbituric acid—a tablet on the tongue with a salt spoon of cognac emulsifies and is easily taken. Preferable to other hypnotics. It is relatively assimilated while Veronal is passed to the extent of 80% as such!—Watson Smith, P.J. i./18,219.

Recovery after taking 2·7 Gm. of Dial.—B.M.J.E. ii./27,103.

℗1 ✱ **Dialacetin** (T.M. 379525). Hypnotic and antineuralgic, analgesic and Antipyretic.—M.P.C., May 2, '22,362.

Tablets contain 4 grains of Allylparacetaminophenol and $1\frac{1}{2}$ grains of Dial. Nocturnal fits in epilepsy often respond to this ($\frac{1}{2}$ to 1 tablet at night, or twice daily) when other remedies fail.—C. Worster-Drought, L. ii./25, 892,1095.

℗1 ✱ **Didial** (T.M. 376649). Tablets contain 1/3 grain of Diallylbarbiturate of Ethylmorphine, and $1\frac{1}{2}$ grains of Dial.

One to 3 tablets employed for the induction of *Twilight Sleep*.

℗1 ✱ **Luminal** (T.M. 337916).—PHENYL-ETHYL-BARBITURIC ACID. P.G. VI., Ph. Ned. V., P. Svec. X., F.E. VIII., P. Belg. IV., P. Ital. V. *Syn.* Phenobarbitalum, U.S. X. ✱ **Gardenal** (T.M. 412226) is the French equivalent.

$$\begin{matrix}C_6H_5\\C_2H_5\end{matrix}{>}C{<}\begin{matrix}CO.HN\\CO.HN\end{matrix}{>}CO=232{\cdot}1096.$$

Wholesale and retail vendors must label "Poison" and treat otherwise as ℗1.

Dose.—In simple insomnia $1\frac{1}{2}$ to 5 grains (**0·1 to 0·3 Gm.**) dissolved in hot water, where there is excitement 5 to 6 grains up to 12 grains (**0·8 Gm.**)—latter is *maximum dose*—as stated in P. Belg.

A modification of Veronal, an Ethyl group being replaced by a Phenyl radical, hence the action is intensified. (Details of synthesis.—J.A.C.S. 1918, 40,723.) White powder with slight bitter taste, almost insoluble in water. ***Soluble*** in Alcohol 90% 1 in 15, Ether 1 in 40, Chloroform 1 in 50—by our experiments.

Uses.—Hypnotic in conditions of excitement, in sleeplessness

associated with pain, migraine, chorea, children's convulsions, in mental conditions, etc. Bowels to be kept open and kidneys in good working order.

For references to its use, and toxic effects, see under Luminal-Sodium.

Luminal Tablets $\frac{1}{4}$, $\frac{1}{2}$, 1 and $1\frac{1}{2}$ grain are made.

P1 ***Luminal-Sodium.**—P.G. VI., P. Svec. X. Sodium Phenobarbital. $C_{12}H_{11}O_3N_2Na=254{\cdot}0988$.

Dose.—Per os 1 to 2 grains (**0·06 to 0·12 Gm.**), once a day.

Hypodermically $\frac{1}{2}$ to 3 grains (**0·03 to 0·2 Gm.**) daily in 20% solution is used, *e.g.*, in epilepsy, but the matter is *sub judice*.

P.G. VI. states max. single dose 6 grains (**0·4 Gm.**); *pro die* 12 grains (**0·8 Gm.**).

A white crystalline powder, readily soluble in cold water. Solutions must be freshly prepared with cooled boiled water.

Incompatible with Ammonium Salts as they decompose quickly, *e.g.*, the Bromide and Acid salts and otherwise as caustic alkalis. In preference give it alone.

Luminal is more poisonous than Veronal.—Sir W. H. Willcox, L. ii./13,1180.

Luminal Sodium Tablets 1 grain are made.

Epilepsy.—125 cases compared under Sodium Luminal and Bromide. Patients with diurnal fits whilst under Bromide showed marked reduction on the number under Luminal. They felt brighter. Cases with more than four fits a month also showed improvement, but not so marked, and so on. 35 were either not improved or deteriorated while the remainder did better under Luminal. The cases least affected were those whose fits occurred in bouts at considerable intervals. A class of epileptics probably exists who are more refractory to bromide treatment than others. Dose used, 6 grains a day of the Sodium salt. It would be converted into the acid by the acidity of the gastric juice. Giddiness and drowsiness sometimes observed. No signs of formation of habit.—F. Golla, B.M.J. ii./21,320.

Given in solution with hot milk or water, in doses of one or two grains once a day, usually at bedtime. Continental observers consider 3 to $4\frac{1}{2}$ grains can safely be given to adults over prolonged periods, under adequate supervision. Reduction in fit incidence and increase in weight. Best results in cases of major epileptic attacks.—J. Tylor Fox, L. ii./21,558.

Some say it is at best a palliative and not a specific.—Jl. A.M.A., Aug., '20,588; Pres., Feb., '21,67.

Used in epilepsy of varied types even where large doses have to be given in an attempt to influence forms of mid-brain tremor—with good effect.—W. Johnson, L. ii./22,275. To give more than 4 or 5 grains a day, in general, is to ask for toxic effects.—*ibid.* 288.

It arrests seizures but also checks normal play of the nerve centres and is liable to produce a physical and mental torpor. L. Cheinisse, La Presse Med., Jan. 14, '22, see also Ther. Gazette, Dec. 21—the drug thought not to cure; prolonged use dangerous and withdrawal requires care.—C.D., June 17, 1922, p. 66.

Admirable in cases of convulsions; lessens number of attacks, and in some cases stops them. Reputed danger in sudden suppression of Luminal is exaggerated. Depression and complications are due to too strong doses—doses vary according to age of patient and intensity of malady.—B. Conos, La Grèce Médicale, July—Aug., '22, per Jl. Trop. Med., Dec. 1, '22,383.

Never more than $1\frac{1}{2}$ grains to start.—Jl.A.M.A., Sept., '22,788. As palliative superior to bromides. Should be discontinued gradually.—Per Pres., Jan. 23,23.

Except in epilepsy, Luminal is very disappointing. A sudden cessation may cause the same symptoms as a large dose.—S. Grossman, L. ii./25,677.

In major type of fits useful, but is of no value in hysterical fits. Tolerance is apt to occur, so that the results in the first 3 months may be the best. Outside a resident institution, 3 to 4 grains should be made the maximum dose in 24 hours.—L. ii./25,713. See also *ibid.* 728,840,892,943.

Status epilepticus well treated by hypodermic injection of Luminal-Sodium from ½ to 3 grains. Solution should be freshly prepared.—W. J. T. Kimber, B.M.J. i./26,16.

Some striking results: stopping its use followed by an increase of fits.—J. Tylor Fox, L. ii./27,589. See also W. Johnson, L. ii./27,733.

Epilepsy treated by Luminal. Doubtful whether 5 or 6 grains should be exceeded as a single dose *per os*. Rashes and poisoning symptoms—headaches, vertigo, lethargy, etc. Also of use in migraine, insomnia (1 to ½ grain at bedtime), aural vertigo. Recurrent attacks well treated. Also in cutaneous affections with a neurotic factor.—W. Russell Brain, L. ii./29,867.

Hypodermic injection of 1½ grains effective in severe pain, such as tabetic crises and herpes zoster. Relief in 20—30 minutes.—L. Gunther and H. M. F. Behneman, per Jl. A.M.A. ii./28,832.

Migraine.—Bromide failed in migraine, and in a few cases Aspirin, and in others Pyramidon (gr. vii) with Cannabin Tannate (gr. iii) cut short the duration of the headache. True migraine, which in its characteristic type is notably hereditary, has been treated with best success by Luminal. The dose, as a rule, should not be more than ¾ grain thrice daily at first, reduced to twice daily after a fortnight if the result is good, and later to once daily at bedtime. After a week various cutaneous rashes may be seen, but are unlikely if the above dosage is not exceeded.—Wilfred Harris, B.M.J. ii./22,786. See also R. Hearn, B.M.J. ii./22,893.

Arterial blood-pressure in 85% of cases of hypertension, decreased by Phenobarbital. Large doses produce marked toxic symptoms.—Per Jl. A.M.A. ii./25,1427.

VOMITING OF PREGNANCY completely controlled by ½ to 1 grain of Luminal nightly, but tends to recur if drug is omitted. Non-toxic in this dose over long periods.—A. Elliott, B.M.J. ii./31,1119.

Toxic Effects of Luminal.

Scarlatinaform rashes produced by Luminal 1 grain *bis die*.—I. Sachs B.M.J. ii./25,1098.

Eruption resembling measles following use of 0·1 Gm. of Luminal-Sodium daily for 11 days.—Per Jl. A.M.A. ii./25,707.

Dermatitis, with total loss of hair and nails, following daily administration for three weeks of 0·1 Gm. Luminal.—B.M.J.E. ii./24,53. *See also* Jl. A.M.A. i./22,1199, Pres., Jan., '23,23.

A case of Luminal poisoning.—L. ii./25,596.

It has generally been found that the effective dose of Luminal is very near the toxic dose, more than 3 grains daily producing ataxia.—J. H. Hannan, Pr., Oct., '27,262.

Luminal rash, 41 cases. It seems that the cause must be a selective tissue reaction to the drug dependent on constitutional factors about which we are still ignorant.—W. C. Menninger, Jl. A.M.A. ii./28,18.

Ⓟ**Theominal.**—A combination of Theobromine 0·3 Gm. and Luminal 0·03 Gm. has been used in arteriosclerosis, angina pectoris, cardiac affections and climacteric disorders.

✱**Elbon-Ciba** (T.M. 343704). CINNAMOLYL-*p*-OXYPHENYLUREA.

$C_6H_5.CH:CH.CO.OC_6H_4.NH.CO.NH_2 = 282{\cdot}1252.$

Insoluble crystals, stated to have antipyretic and antiseptic action. Used in pulmonary tuberculosis (60 grains daily increased), for infectious catarrhs of respiratory tract, and in chronic endocarditis.

Asthma. Relief in long-standing cases—30 to 60 grains a day.—B.M.J. i./25,641.

Dibromin. *Syn.* DI-BROM-MALONYL-UREIDE $Br_2:C:(CO.NH)_2:CO. = 285{\cdot}8626.$

White crystals, containing approx. 56% Bromine, in capsules containing 6 grains (0·4 Gm.). In contact with infected tissues the Bromine is liberated and exerts an oxidising effect on micro-organisms. Its solutions are practically

non-irritating and do not coagulate serum. Used for irrigations, wet dressings, moist packings, douches and gargles in solutions of 1 : 10,000 to 1 : 500. Advisable to begin with weak solutions, gradually increasing strength as the irritability of the tissues subsides.

In presence of 1% Peptone solution the Rideal Walker Coefficient is reduced to 0·8 compared with 50·0 in the absence of organic matter. Hypochlorites and Permanganates are also greatly reduced in germicidal power in presence of organic matter.—M.P.C., Nov. 19, '24,412.

Nirvanol. γγ-PHENYLETHYLHYDANTOIN.



=206·1096.

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**) Formed by combination of Urea and Glycol. A tasteless crystalline powder, slightly soluble in water. Hypnotic and sedative. Not to be administered over lengthy periods.

Dose.—In chorea, 0·3 Gm. *per os* daily for a child of 9–14 years. In most cases 8 to 14 days after beginning of treatment there is a well marked morbiliform rash accompanied by pyrexia. The drug is then stopped. It causes a change in the blood, *viz.*, a true eosinophilia reaching its maximum just before appearance of the rash. In addition there is generally a leucopenia. Conjunctivitis and œdema of the eyelids should be watched for and treatment stopped immediately. Report of 6 cases with beneficial results. Originally advocated as hypnotic, and as a sedative in epilepsy and various types of psychoses.—F. J. Poynton and B. Schlesinger, L. ii./29,267.

Dose.—0·25 Gm. from 5 to 9 years, half of which is given twice a day. 0.3 Gm. given in two doses never exceeded. The aim is to produce a reaction and stop and in any case it is stopped in 14 days.—F. J. Poynton, Index of Treatment, 1931.

Symptoms improved and attack sometimes cut short in a dramatic way. Only to be used under constant supervision.—C. F. T. East and E. R. Cullinan, L. ii./30,190.

After-results disappointing. Only exploitation of a new sedative whose super-excellence has yet to be proved. Doubtful whether it will outlive the popularity due to its novelty. Adalin preferable.—R. Miller, M.A., '31,99.

Purpura hæmorrhagica, nephritis, and a fatal case of **dermatitis exfoliativa,** have followed its use in chorea. Effective, but catastrophe can neither be seen, foreseen nor prevented.—L. ii./31,545.

ℙ1 URETHANE.

ℙ1 *All "Poisonous" Urethanes. Wholesale and retail vendors must label "Poison" and treat otherwise as* ℙ1.

$CO(OC_2H_5)NH_2$=89·0626. *Syn.*—**Ethyl Carbamate,** Fr. Cx., F.E. VIII., P. Ital. V.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**). **Tablets,** 5 grains (**0·3 Gm.**).

Colourless crystals (M.pt. 48-50° C.), inodorous, with saline taste.

Manufacture.—By heating several hours in an autoclave or metal tubes, Urea Nitrate in excess of Absolute Alcohol at 120 to 130° C. and extracting first with water and this solution with Ether several times, Ammonium Nitrate is formed. Distil to rectify (B.pt. 180° C. without decomposition). $CO(NH_2)_2.HNO_3+C_2H_5OH=NH_4NO_3+CO(OC_2H_5)NH_2$.—Bunte Zeit. f. Chem., A. 151,181.

Incompatible with Caustic Alkalis and with Acids. ***Soluble***

1 in 2 of Water; 1 in 1 of Alcohol 90%. Fr. Cx. states 1 in 1 of Water and 1 in 0·6 of Alcohol (95%).

Uses.—Hypnotic, produces normal sleep, the heart is not affected; especially suitable for children; in cases of delirium tremens, and in acute mania and tetanus.

Quinine and Urethane, see p. 734.

VALERIANÆ RHIZOMA.

The dried rhizoma and roots of *Valeriana officinalis* and of *V. Wallichii* (**V. Indica**), (*Valerianaceæ*), collected in the autumn. —*B.P.* '14 contain volatile oil and two alkaloids.

Uses.—A valuable drug, capable of restoring mental efficiency and relieving mental misery, *e.g.*, in hypochondriasis or melancholia. Ammoniated Tincture of Valerian in ½ dr. doses and 7½ grains Potassium Bromide. Is Borneol the active principle of Valerian? —J. S. Manson, B.M.J. ii./28,842.

Alcoolature Stabilisée de Valériane (and a similar preparation of Æsculus Hippocastanus, the horse chestnut) are now in Fr. Cx., Nouv. Supp., 1926. The Valerian preparation is made by adding the fresh entire roots to 95% alcohol, equal parts by wt., while maintained boiling on the water bath for 20 minutes, allowing to cool and repeating the process; finally making up any loss. (In the case of the Horse Chestnut Alcoolature, the fresh non-decorticated chestnuts (Marron d'Inde) are used, employing 75% alcohol throughout.) No doses are given. Other Alcoolatures, *e.g.*, d'Aconit, d'Anémone Pulsatille, are in Fr. Cx. (1908).

If the enzyme be killed by stabilising before drying, the root has only a small degree of odour. The author tried the procedure on a cwt. of fresh Valerian recently (1927) and must confess the ultimate dried root and liquid preparations had little less odour than the customary preparations.

History and uses of Valerian.—J. Grier, P.J. i./29,303. See also N. Smodlaka, P.J. ii./21,402.

Oil from **Indian Valerian Root** contains a sesquiterpene hydrocarbon and a small quantity of sesquiterpene alcohol. Combined Valerianic Acid and Formic Acid and a small quantity of free Valerianic Acid and other constituents present.—K. Bullock, P.J. ii./26,152.

Extractum Valerianæ Liquidum. 1=1 Hydro-alcoholic.
Average dose.—30 minims (**2 Cc.**).

Extractum Valerianæ.
Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**), is made by concentrating the last mentioned.

Mistura Valerianæ Composita, R.F.H.—Tincture of Valerian 3, Fœtid Spirit of Ammonia 2, Camphor Water to 48.

Tinctura Valerianæ Ammoniata (*B.P.* '14). 1 in 5. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). U.S. X. 1 in 5 of Sal Volatile. An antispasmodic and nervine tonic.

Flavoring.—Glyl Coriandri, Glyl Menthæ Piperitæ, Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum, Tinctura Carminativa.

Acidum Valerianicum, Fr. Cx., P. Helv. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**), in syrup or in gelatin capsules. Consists principally

of optically inactive Isovalerianic Acid $(CH_3)_2.CH.CH_2.COOH$. with more or less dextrorotary Methyl-Ethyl Acetic Acid, $(C_2H_5)(CH_3)—CH:COOH=102·083$.

An oily liquid, Sp. Gr. about 0·93. Given in hysteria and nervous affections.

Ferri Valerianas. $Fe_2(C_5H_9O_2)_2(OH)_4=381·8516$.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

A nervine stimulant and emmenagogue, and is used in anæmia.

Sodii Valerianas. $C_5H_9O_2Na=124·0672$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In white crystals; used as a nervine sedative.

Zinci Valerianas. ZINCI VALERAS.

$(C_4H_9COO)_2Zn=267·5204$. (**B.P. '14** $+2H_2O$).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

White powder or in pearly crystals, very slightly soluble in water. Soluble in alcohol. Pills 3 grains each.

This is given as a nerve and general tonic, *e.g.*, after hay fever, and as prophylactic, but pharmacologists say it has no efficacy.

Incompatible.—Acids and metallic salts. (*See also* zinc salts.)

Amyl Valerianate. Iso-valerianic Iso-amyl Ester.

$C_5H_{11}.C_5H_9O_2=172·156$. *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.**) in capsules or diluted in alcohol.

A mobile liquid, Specific Gravity 0·858. Miscible with Alcohol. Is employed as a sedative and antispasmodic. Has been recommended as gall-stone solvent. Is known as 'Apple Essence.'

Elixir Valerianæ et Bromidi.—*Martindale.*

Dose.—½ ounce (**15 Cc.**) diluted.

Valerian Extract (Recent) 5 grains, Sodium Bromide 5 grains, Calcium Glycerophosphate 5 grains, Aromatic Elixir 2 drachms. Peppermint Water to ½ ounce. A sedative preparation.

Bromival.

A Canadian Elixir of Bromides and Valerian, in which the Valerian taste and odour is effectively masked. Contains 90 minims Ammoniated Tincture of Valerian per ounce.

Dose.—½ to 2 drachms well diluted, as a nerve sedative.

Borneol-isovalerianate. *Syn.* HYSTEROL.

Gelatin capsules contain 4 grains. A valerian substitute. In neurasthenia hysteria, etc. The action of Borneol is to diminish reflex irritability while valerianic acid acts as antispasmodic. Best taken after meals to prevent eructations.

℞ P1 **Trivalin.**—*Dose per os* 8 minims (**0·5 Cc.**), *hypodermically* 8 to 15 minims (**½ to 1 Cc.**), once to 3 times daily.

A solution of Valerianic Acid with Morphine Valerianate 1/3 grain (0·02 Gm.). Caffeine Valerianate 1/18 grain (0·0037 Gm.). Cocaine Valerianate 1/12 grain (0·005 Gm.) in 1 Cc. Said to have the therapeutic effects of Morphine without disadvantages. Anodyne, *e.g.*, in painful dressings, inoperable cancer, gall-stone, colic and neuralgia. As tonic in delirium, mania and hysteria.

℞ P1 **Capsules** are made = ½ Cc. of the above.

The combination is in the proportion of one molecule each Caffeine Valerianate and Cocaine Valerianate and 4 molecules Morphine Valerianate.

℞ P1 **Trivalin** is made in combination with **Hyoscine Valerianate** 1/115th grain (0·00056 Gm.) per Cc., for treatment of the insane. *Dose.*—0·25 to 0·5 Cc.

ZINCUM.

Zn=65·38.

To prepare **Arsenic-free** melt in a clay crucible and add about 15 grains of Sodium to a pound in small bits at intervals. Remove the scum, avoiding iron implements, and repeat in another clean crucible. Granulate by pouring into water when almost solidified.

Metabolism.—Zinc takes a part in the normal metabolism of plants and animals. Corn deprived of Zinc becomes chlorotic: it acts as a catalytic fertiliser for maize: animals on a Zinc-free diet do not flourish: the Zinc content of yolk of egg, milk and spermatic fluid, is high.—L. ii./26,191.

Abnormal amounts of Zinc may enter and leave the body for years without causing symptoms detectable clinically or by laboratory examinations.—L. ii./26,530.

Incompatibilities of Zinc Salts.—Alkaline carbonates, and alkalis in general, vegetable infusions and milk.

Antidotes.—Alkaline Carbonates in warm water, Demulcents, Milk and Egg, Tea and Tannin solutions.

Zinci Acetas.

$(CH_3COO)_2Zn.\ 3H_2O$=237·4736. *B.P.* '14 and U.S. have $2H_2O$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) as a nervine tonic, but pharmacologists have no evidence of its utility. 10 to 30 grains for an emetic dose.

White crystals with faint acetous odour. Soluble in water 1 in 2·5, about 1 in 40 of alcohol 90%. Used as astringent lotion ($\frac{1}{4}$ to 1%).

Zinci Benzoas. $Zn(C_6H_5.COO)_2$=307·458.

White powder, soluble in water. Examination of.—P.J. ii./13,686.

Zinci Bromidum, $ZnBr_2$=225·212.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) in water.

White deliquescent powder. A little dilute hydrobromic acid will make a clear solution. Incompatible with alkaloids and salts of heavy metals. Has been used with success in epilepsy.

Zinc Carbonas.

$ZnCO_3.(ZnH_2O_2)_2,H_2O$=342·1868.

Employed for tender surfaces, and to check perspiration.

Ⓟ Zinci Chloridum (*B.P.* '14). $ZnCl_2$=136·294.

Ⓟ Zinc Chloride and liquid preparations of Zinc Chloride except preparations intended for soldering or other industrial purpose, provided they are contained in closed vessels labelled "Poisonous," and bearing the name and address of the seller and the special purpose.

In deliquescent masses soluble 1 in 0·34 of water.

Ⓟ Causticum Zinci Chloridi.

Zinc Chloride 4, Solution of Antimony Chloride 2, Starch 1, Glycerin *q.s.*

Ⓟ Collodium Zinci Chloridi. 1 in 6 of collodion.

Ⓟ Collutorium Astringens, R.D.H.

Zinc Chloride 5 grains, Zinc Sulphate 10 grains, Water to 1 ounce.

Ⓟ Guttæ Zinci Chloridi, R.O.H. and **St. Th. H.**, $\frac{1}{2}$, 1 or 2 grains to 1 ounce.

℗1 ℗ **Guttæ Zinci Chloridi cum Cocainæ Hydrochlorido.**
½, 1 or 2 grains to ounce with Cocaine Hydrochloride 10 grains to ounce.

℗ **Guttæ Zinci Chloridi cum Adrenalin, R.O.H.** *See* Adrenalin.

℗ **Guttæ Zinci Chloridi (Aural) R.N.H.** Zinc Chloride 4 grains, Glycerin 2 drachms, Alcohol (90%) to 1 ounce.

℗ **Liquor Zinci Chloridi** (*B.P.* '14). Sp. Gr. 1·530.
Four minims of this solution = 3 grains of solid Zinc Chloride. On diluting a trace of hydrochloric acid will be necessary to clear it.

Uses.—A powerful odourless caustic, antiseptic, and anti-putrescent. The liquor is a strong deodorising antiseptic solution; it is *very poisonous.* Ten grains to the ounce of water may be used as a stimulant lotion to wounds and ulcers. Also used as **Paste** with Starch and Glycerin.

In the treatment of erosion of teeth is useful to touch painful spots, or the addition of a little to Chloroform-Mastich forms a useful paint.—Smale and Colyer.

℗ **Lotio Zinci Chloridi, R.O.H.,** ½ or 1 grain to 1 ounce.

For wounds Zinc Chloride solution 40 grains to the ounce was much favoured by Lord Lister. Prevents the occurrence of putrefaction in spite of access of septic material. Importance of free drainage.—G. T. Beatson, L. ii./15,121.

Tuberculous Ulcerations. Pain abolished and ulcerations healed after 3 applications of solution of 3 Gm. Zinc Chloride in 10 Cc. 80% Alcohol. Repeat every 3 weeks: Tincture of Iodine applied daily.—Per Jl. A.M.A. i./27,1039.

℗ **Injectio Zinci Chloridi, L.H.** for vaginal use.
Zinc Chloride 5 grains, Water to 1 pint, *i.e.*, 0·06% or 1 in 1,600 in round numbers.

Zinci Citras. $[C_3H_4(OH).(COO)_3]_2Zn_3+2H_2O=610·2492$.
Dose.—3 to 12 grains (**0·2 to 0·8 Gm.**). White powder with metallic taste, not perfectly soluble in water. Has been used for epilepsy.

℗1 **Zinci Cyanidum.** $Zn(CN)_2=117·396$.
An insoluble white powder with antiseptic properties.
Cf. **Mercuro-Zinc Cyanide.**

℗1 **Zinci et Potassii Cyanidum.** $Zn(CN)_2.2KCN=247·612$.
Dose.—$\frac{1}{10}$ to 1 grain (**0·006 to 0·06 Gm.**).
A soluble cyanide, possessing the properties of hydrocyanic acid.

Zinci Iodidum. $ZnI_2=319·244$.
Average dose.—1 grain (**0·06 Gm.**).
A white deliquescent powder turning brown on exposure. For cerebral, spinal, and nervous diseases in the third stage of syphilis.

Zinci Lactas. $(C_2H_4.OH.COO)_2Zn, 3H_2O=297·5348$.
Dose.—½ to 3 grains. (**0·03 to 0·2 Gm.**) Max. *pro die* 10 grains. (Has been used in France up to 3 Gm. for a dose!—Dorvault.)
White crystals soluble 1 in 60 of water. In epilepsy.

Zinci Oxidum, Zinc Oxide. ZnO=81·38.

Dose.—3 to 10 grains (**0·2 to 0·65 Gm.**). **Tablets**, 2 grains.

Has been used for nervous debility, migraine, hysteria, *cf.* Zinc Acetate. Chiefly employed locally.

Has definite bactericidal properties. While it is a most neutral so far as the cells of the skin are concerned it is split up by acid producing microbes into disinfectant compounds.—Haxthausen, Brit. Jl. Derm. & Syph., 1928, per Pres., Oct., '29,330.

Mistura Zinci Oxidi, E.L.

Zinc Oxide 1 grain, Glycerin 10 minims, Water to 1 drachm, for children.

Ⓟ**Mistura Zinci Oxidi cum Opio, E.L.** contains Tincture of Opium, ½ minim in 1 drachm of the above.

Unguentum Zinci (*B.P.* '14). Zinc Oxide 15% in Benzoated Lard.

Unguentum Wilsoni. *Syn.* WILSON'S OINTMENT. P. JAP. IV.
Zinc Oxide 5, Benzoic Acid 1, Lard 30.

Unguentum Zinci Carbolisatum. Zinc Oxide 10, Phenol 2, Soft Paraffin 88. Dermatitis is well treated with this.

Unguentum Zinci cum Acido Salicylico.

Salicylic Acid 40 grains, Zinc Ointment 1 ounce, Soft Paraffin 1 ounce.

Petrolatum Zinci Oxidi. Zinc Oxide 1, White Vaseline 9. For surgical use starch is sometimes added, *cf.*, Pasta Zinci cum Amylo.

Linimentum Zinci Spissum, Zinc Liniment, P. Svec. X.

Zinc Oxide 200, Salicylic Acid 1, Adeps Lanæ 100, Olive Oil 300, Lime Water to 1000.

Cremor Zinci.

Zinc Oxide 3, White Vaseline 17, Perfume *q.s.*—For nursery use.

Cremor Zinci, St. M.'s H.

Dissolve Lanolin 3 in Olive Oil 8 by heat, sift Zinc Oxide 8 into the mixture and whip up with Lime Water 8. Useful in acute eczema (drying stage where there is much redness.

Cremor Zinci et Calaminæ, V.H.C.

Prepared Calamine 1, Zinc Oxide 1, Lime Water 4, Almond Oil 4.

Gelatinum Zinci. Unna's Paste.

Gelatin 4, Water 16, soak 12 hours, then heat to dissolve, and add Zinc Oxide 6 previously rubbed down with Glycerin 12. For use it is melted and applied with a brush to eczematous surfaces. Ichthyol, Resorcin and other medicaments may be added.

Varicose Ulcers treated by the above after thoroughly cleansing the leg or foot with Soap and Spirit, Alcohol, Mercuric Chloride Solution 1 in 2,000 to 1 in 4,000, or 1 in 40 Carbolic Lotion. The Paste previously melted and cooled is poured over the ulcer, which has previously been disinfected with Hydrogen Peroxide or Mercuric Chloride or Carbolic Lotion. The part is then dried and the paste is bandaged on with a gauze bandage. Another layer of paste is applied; this is covered with a bandage, and so on until four layers have been applied. May be left in many cases undisturbed for weeks, but it is safer to dress again after two or three days with Salicylic Talc if any discharge. It forms a new skin, pliable and slightly elastic.

A preparation of the composition Zinc Oxide 1, Gelatin 2, Glycerin 3, Water 4 parts, of value in arthritis, dermatitis, erysipelas, erythema nodosum and simplex, myositis, periostitis, phlebitis and varix of the leg, synovitis,

'tennis leg,' minor thrombosis and contusions and sprains of joints of limbs. It is the treatment par excellence for chronic varix and acute phlebitis. Method of preparation and application of dressings.—W. Muir Smith, B.M.J. i./27,137.

Varicose ulceration well treated by moist paste bandage of Cellan-Jones.—E. Garden, B.M.J. i./31,652.

Gelatin Compound Phenolised.—Gelatin 625 parts, Zinc Oxide 250, Glycerin 1,900, Water 1,900 containing 1·5% Phenol. Heat till liquid and apply with brush, apply spiral bandage, and brush on another layer, repeat to total of three bandages and four layers of the preparation. For chronic ulcers, unhealed secondary burns and varicose veins.—N. N. R., Jl. A.M.A. ii./29,1809.

A further modified form: Zinc Oxide 10, Glycerin 10, Glue 4, Gum Acacia 5, Water 30. Spread on bandages for varicose ulcers.—C. J. Cellan-Jones, B.M.J. ii./560.

Pasta Zinci cum Amylo, St. M.'s H.

Zinc Oxide, Starch, Soft Paraffin, Lanolin, of each equal parts. For intertrigo and disordered perspiration.

***Pellanthum** (T.M. 261943), containing 20% Zinc Oxide, is a special preparation and is cooling and soothing for irritable surfaces.

Compounds are Ichthyol, 3%, 5%, 10%; Ichthyol, 10%, with Resorcin 5%; Salicylic Acid 1% and 2%; Liquor Carbonis Detergens 10% and 15%; Huile de Cade 5%; Phenol 2% with Menthol 2%.

Lassar's Paste for Eczema. *Syn.* MORRIS'S PASTE. Zinc Oxide 24, Starch 24, Salicylic Acid 2, Yellow Soft Paraffin 50.=**Pasta Zinci Composita, U.C.H.**

Useful in chronic and acute eczema when weeping. In irritating conditions the acid may be omitted. It may be retained and increased in amount where there is less inflammatory reaction and where much scaling has occurred.

Pasta Carbonis et Zinci.

Soak Gelatin 16 in a portion of the total Glycerin required (20), and a portion of the water (50 in all required), for 12 hours. Make a paste of Boric Acid 6, Zinc Oxide 6 and Charcoal 18 with remainder of liquids, mix on water bath, and pour into suitable vessel to set.

For leg ulcers the Charcoal is a useful addition. Boric Lotion fomentations should first be carried out to clean the ulcer. If tending to be sluggish Red Lotion helps.

℗**Pilula Zinci cum Belladonna, T.H.**

Zinc Oxide 2 grains, Extract of Belladonna $\frac{1}{8}$ grain. *Dose.*—1 or 2.

Zinc Oxide, Starch, Boric Acid, and powdered **Orris Root,** and mixtures of these, are employed for the toilet.

Pulveres Conspersa (Dusting Powders), **St. Th. H.** include Pulv. Acid. Acid Boric Co., Pulv. Ac. Boric, et Amyli, Pulv. Calomel et Ac. Boric and others.

Calamina Præparata *B.P.* 1885.

Syn. LAPIS CALAMINARIS PRÆPARATUS.

Impure zinc oxide prepared by calcining native Calamine (zinc carbonate) and reducing it to an impalpable powder. Genuine Calamine is useful as a dusting powder, and for making lotions, and may be mixed with Carmine Triturate to produce the desired tint.

Linimentum Calaminæ, G.H.

Calamine 20 grains, Zinc Oxide 15 grains, Soft Soap 15 grains, Olive Oil 4 drachms, Water to 1 ounce.

Linimentum Calaminæ Compositum. U.C.H. is Prepared Calamine 9, Zinc Oxide 5, Zinc Oleo-Stearate 3, Wool Fat 3, Soft Paraffin 20, Liquid Paraffin to 100.

Lotio Calaminæ U.C.H., E.L.

Prepared Calamine 9, Zinc Oxide 5, Glycerin 3, Water to 100. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in eczema, especially where the surface is red and tender, also to conceal acne spots on the face. ℗One grain of mercuric chloride may be added to 6 ounces as antiseptic. ℗**Lotio Calaminæ E.G.A. (Lotio pro Acne, N.H.W.)** is 20 grains each of Calamine and Zinc Oxide and 20 minims of Glycerin to the ounce of Water.

For chilblains on the hands this lotion and the following made double or treble strength allay the intense irritation.

In cutaneous affections, *e.g.*, of rheumatic origin a lotion of this kind is useful.—J. Galloway, Pr., Jan. '12,76.

Lotio Calaminæ Oleosa, St. M.'s H., E.L.

Calamine 40 grains, Zinc Oxide 20 grains, Lime Water 3 drachms, Olive Oil 1 ounce (E.L. *to* 1 ounce).

In chronic eczema, *e.g.*, to a freely weeping surface with redness and itching apply with brush or cotton wool swab or spread on thin washed butter muslin. Very important that the inflamed surface should not be treated with a hot thick dressing. Perchloride 1 in 2,000 to 1 in 3,000 may be desirable addition.

℗**Unguentum Plumbi cum Calamina.** 'Erysipelas Dressing,' St. G. H. Lead Plaster 18, Calamine 2, Olive Oil 9, Lard to 48.

Zinc Oxy-Phosphate is employed as a dental filling. It is supplied in the form of dried powdered zinc oxide in various colours, with the 'liquid,' which consists of phosphoric acid. These are mixed intimately prior to use as a flooring when not too near the pulp.

Zinc Oxy-Sulphate. Consists of calcined zinc sulphate and zinc oxide; mucilage of acacia is used to mass.

10 grains (as much as lies on a sixpence) mixed quickly with at least 5 drops of the Fluid makes a good mass which sets as hard as stone.

Fletcher's Artificial Dentine is similar.

Zinc Oxy-Chloride. The 'powder' is of zinc oxide and the 'liquid' zinc chloride solution. Mix thoroughly. Sometimes used as a root-filling and for sensitive dentine; will irritate a live pulp.

Zinci Salicylas. $Zn(C_6H_4.OH.COO)_2+3H_2O=393{\cdot}5048$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystals soluble in water 1 in 24, and in alcohol 1 in 2·5. As dusting powder and may be combined with gelatin (*v.* Gelatinum Zinci). Internally is used as a substitute for the Valerianate.

Zinci Sulphas (*B.P.* '14). $ZnSO_4.7H_2O=287{\cdot}5492$. *Dose.*—1 to 3 gr. (**0·06 to 0·2 Gm.**) tonic; 10 to 30 gr. (**0·6 to 2 Gm.**) emetic. Fr. Cx. Max. single and daily dose 15 grains.

Soluble 1 in 0·65 water at 59·5° F.—P.J. i./02,552.

Uses.—For gleet and gonorrhœa ½ to 1% injections are given, frequently combined with alum or sometimes Ferrous Sulphate.

Collyrium Astringens Luteum. P. Austr. (1906). *Syn.* GUTTÆ HORSTI. HORST'S EYE WASH.

Ammonium Chloride 2, Zinc Sulphate 5, Distilled Water 890, dissolve and add Camphor 2, dissolved in diluted Spirit (Sp. Gr. 0·895) 100, then add Saffron 1. Digest 24 hours and filter. As an astringent lotion is used for conjunctivitis.

A Collyrium containing ½ grain of Zinc Sulphate and 10 grains Boric Acid per ounce preferable to organic Silver Compounds.—L. ii./11,1570.

Smarting of zinc or copper salts in collyria may be relieved by using a saturated solution of potassium chlorate instead of water.—B.M.J. i./26,928.

Meningococcus infections (carriers) cleared up by means of 1·2% solution in the 'Falmouth Steam Atomizer.'—B.M.J. ii./16,673.

Chlorosis can be rapidly cured by emetic of 20 grain doses for 6 to 8 days, in the morning fasting, of zinc sulphate. Iron sulphate (common) originally given by an old dame.—B.M.J. ii./08,1145.

Lotio Rubra U.C.H. Zinc Sulphate 0·5, Compound Tincture of Lavender 2·5, Water to 100. L.H. has Zinc Sulphate 2 grains. Fuchsin $\frac{1}{500}$ grain and Water to 1 ounce. R.O.H. Zinc Sulphate 1 grain, Compound Tincture of Lavender 15 minims, Spirit of Rosemary B.P. 15 minims, Water to 1 ounce.

'Solubes' Zinci Sulphatis are equivalent to 2 and 10 ounces respectively of the above lotion.

'Solubes' Zinci Sulphatis et Aluminis contain 10 grains of each, for dissolving in a pint, more or less as required, of warm water.

'Collapsubes' of Zinc Sulphate 1 grain in 1 ounce of gelatin basis are for gleet and gonorrhœa.

Lotio Zinci Sulphatis. Zinc Sulphate 0·25 or 0·5% in Distilled Water. **Guttæ Zinci Sulphatis, R.O.H.,** ½, 1 or 2 grains to 1 ounce.

Lotio Sulphatum.

Zinc Sulphate 30 to 40 grains, Alum 30 to 40 grains, Ferrous Sulphate 20 grains, Copper Sulphate 2 grains, Water 8 ounces.

Collyrium Zinci Compositum, N.H.I.

Zinc Sulphate 6 grains, Boric Acid 30 grains, Distilled Water to 6 ounces.

Ophthalmic Discs of $\frac{1}{250}$ grain **Zinc Sulphate.**

Points of Zinc Sulphate are moulded for intra-uterine use. **Points** of equal parts **Zinc Sulphate** and **Alum,** and of **Copper Sulphate** are also made.

Injectio Zinci Sulphatis L.H. for vaginal use.
Has 60 grains in 1 pint of water, *i.e.*, 0·69% or 1 in 144·9.

CEREBRO-SPINAL FEVER. Disinfection of air with ***Levick's Steam Spray*** containing 1% Zinc Sulphate *see* Cerebro-Spinal Fever.

Lotio Alba (McKenna).

Zinc Sulphate and Sulphurated Potash of each 1½ drachms, Water to 4 ounces.

Acne vulgaris is well treated with this—*cf.* J. F. Christie, B.M.J. i./27,1032.

SUPPLEMENTARY LIST OF DRUGS.

Abrus Precatorius (*Leguminosæ*). Jequirity Seeds, Prayer Beads, Jumble-Beads, Indian Licorice of scarlet colour, contain abrin, a poisonous principle.

Instillation of 5% infusion of crushed Seeds for relief of pannus.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304; see also Trachoma, Therap. Index.

Artificially produced ophthalmia by means of jequirity.—G. McPherson, per T.D.B. 18/21,85.

Absinthium. *Syn.* Wormwood. Dried leaves and tops of Artemisia Absinthium L., *N.O. Compositæ.* The active ingredient is the oil (1%). Its use is tonic and digestive. Infusion 1 in 20. *Dose.*—1 to 2 ounces. The oil is contained in the drink Absinthe. Other essential oils, *e.g.*, anise, coriander, fennel, peppermint, hyssop, angelica and melissa are stated to be additional constituents.

Absinthe-drinking in England. Absinthe should be prohibited in England. Vermouth and Chartreuse contain the Oil of Wormwood.—C. W. J. Brasher, L. i./30,944.

Acaciæ Cortex (*B.P.* '14). *A. arabica* and *A. decurrens.* Dried bark kept for one year. **Decoctum** (*B.P.* '14). *Dose.*—½ to 2 oz. 6% in water. Astringent, suitable as gargle or lotion.

Acetonum (*B.P.* '14). U.S., P. Jap. IV., F.E. VIII. *Syn. Dimethyl-Ketone.* $CH_3CO.CH_3 = 58{\cdot}0468$. *Dose.*—60 to 90 minims (**4 to 6 Cc.**) daily. A colourless, light, inflammable, neutral liquid, with ethereal odour and camphoraceous taste, contained in crude wood spirit, obtained by the dry distillation of acetates; also by the destructive distillation of wood and by the fermentative action of Weissmann's *Clostridium acetobutylicum* on starch (mashed maize).—C.D. i./27,586.

It is miscible with water, alcohol, ether, chloroform, and oils, and is a ready solvent of fats and resins, pyroxylin, celluloid and many other organic substances. It takes up about 25 times its volume of acetylene. If pure, its Sp. Gr. is 0·795 to 0·8. B. pt. 56·5° C. It is largely employed in the manufacture of chloroform.

Pharmacology.—It is particularly potent when a number of just active doses are given; inhibits respiration and heat and produces fall of blood pressure.—J.C.S.A. i./1922,794.

It occurs in small quantity as a normal constituent in the urine, also (frequently in large amount) in that of diabetics, *cf. Vol. II.*

We have determined its *Antiseptic Power* using *B. Coli Communis* as test organism.—See Chapter on Antiseptics, Vol. II.

Acetone Bacillus. Fermentation of Starch, Butyl Alcohol and Acetone, separated by fractionation.—B.M.J. i./22,115.

Acetone has been used in dyspnœa. It has also been given as an anthelmintic, and used for cleansing the skin prior to operation.

Iodo-Acetone.—Iodine 2% in Acetone is used to sterilise catgut. First steep in ligroin to free from fat.—*Vide* also Iodised gut.

Acetophenone. *Syn.* **Hypnone.** $C_6H_5CO.CH_3 = 120{\cdot}0374$.

Dose.—1½ to 5 minims (**0·1 to 0·3 Cc.**) in almond emulsion, or with mucilage or syrup and peppermint water, or in **Capsules** containing ¾ minim. A colourless liquid, with odour of Bitter Almonds. Insoluble in water, but soluble in alcohol and oils. Used as an hypnotic requires care.

Acidum Chromicum. *Syn.* **Chromic Anhydride.**—(*B.P.* '14), P.G. VI. $CrO_3 = 100{\cdot}01$.

In deliquescent, crimson crystals. A powerful oxidising agent. ***Caution: Incompatible*** with alcohol, glycerin, and other oxidisable substances. ***Soluble*** about 5 in 3 of water.

Liquor (*B.P.* '14).—25% *w/v* in water is applied to warts on genitals, to condylomata and lupus; and 1 in 40 to ulcerated gums and mouth sores. For sweating feet 5 to 10% Lotion; in leucorrhœa and ozœna 1 in 2,000. In secondary syphilis of the pharnyx the so-called snail-track ulcer treated with a solution (10 grains to the ounce).—For mucous and warty patches 5% is useful.

Ulcerative stomatitis. The organisms concerned are obligatory anaerobes Chromic Acid relieves pain and removes the necrotic tissue. Used warm 1 in 200 to 1 in 400 and applied with wool round a probe. Immediately after the

use of the chromic lotion paint the affected area with a mixture of 20 grains of Chloretone to the ounce of equal parts glycerin and spirit. *B. fusiformis* Vaccine successful in the acute stages.—Sir K. Goadby, L. i./16,959.

Rodent ulcer treated by Chromic Acid solution, 10% strength, applied with a brush daily with alternately Boric Acid and Zinc ointment. At first the ulcer may actually increase in size. It is less drastic than Arsenic and does not affect healthy tissue cells.—A. Dingwall Kennedy, B.M.J. ii./22,844.

Chromium Plating.—The process consists in wiring the articles to a frame ready for theplating vat, the actual plating (anything up to 15 mins.), unwiring, swilling, and polishing. Current 500 to 1,000 amps. and 4 to 10 volts. Solution contains 50% Chromic Acid. Fumes contain the acid forced up in spray by the evolution of Hydrogen at the cathode. Lassar's Paste modified with a preponderant base of Vaseline smeared on hands and arms before work, and a little instilled into each nostril. Soap containing free Lanolin used in some works. Dermatitis treatment—double strength Calamine solution. When œdema subsides scrub spots with gauze soaked in spirit, dry, and wrap in lint and Lassar's Paste. Chromium ulcers should be cleaned and dressed with Zinc Oxide and Vaseline. Ulceration of the nose treated with gauze soaked in Flavine 1 in 1,000.—H. B. Trumper, B.M.J. i./31,705.

Acidum Cinnamicum. *Syn.* **Phenylacrylic Acid.** CINNAMYLIC ACID. $C_6H_5CH:CH.CO.OH=148{\cdot}0624$. *Dose.*—*Per os*, $\frac{1}{20}$ to $\frac{1}{4}$ grain. Intravenously (in oil) $\frac{1}{50}$ to $\frac{1}{20}$ grain. Made by oxidising Cinnamon Oil or by acting upon Benzaldehyde with Acetyl Chloride. Transparent micaceous crystals, M.pt. about 130° C., slightly soluble in water, soluble in alcohol, ether and oils. ***Uses.***—Has been used to induce leucocytosis. Mostly given as Sodium Salt.

Sodii Cinnamas.—*Syn.* HETOL. $C_6H_5CH:CH.CO.ONa=169{\cdot}0516$.

Dose.—3 to 5 grains *per os*, or hypodermically as Glycerin Solution. ***Soluble*** 1 in 11 water, in glycerin 1 in 10. ***Uses.***—Pulmonary tuberculosis has been treated by intravenous injection of 0·1 Gm. in 10 Cc. normal saline over lengthy periods (Landerer). The cinnamates have vasodilatory action (Oliver), harmless even on prolonged use. Cystitis and influenza have been treated.

Glycerinum Sodii Cinnamatis.

Dose.—30 to 60 minims injected. This 10% solution in glycerin is made by heating to not exceeding 180° C. and has been used hypodermically and intravenously in tuberculosis and cancer; it causes a general leucocytosis. **Sterules** contain 30 minims each.—*cf.* **Injectio Sodii ortho-Coumaratis** *postea*. The papers by the late Lovell Drage in the *Lancet*, *British Medical Journal* and the *Second International Congress of Surgery* at Brussels have been collected in book form, with a preface by Sir Squire Sprigge. It is stated that Lovell Drage had the true spirit of the investigating physician, and that he showed this spirit alike towards the problems of medical life and towards the solution of scientific questions. Drage felt keenly that it was a reproach to medicine that the mortality from cancer should be so high, and should show signs of rising, at a time when advances in diagnosis and treatment were being recorded. He ardently advocated that the medical treatment of cancer should receive attention, with the hope of co-operation from his colleagues.

Strontii Cinnamas $(C_6H_5.CH:CH.CO.O)_2Sr=381{\cdot}7392$. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**). A white powder, soluble about 1 in 120 of water and about 1 in 50 of a mixture of glycerin and water equal parts, and about 1 in 100 of alcohol 90%. This has been used similarly to the Sodium Salt.

Sodium Phenyl Propiolate.—*Syn.* THERMIOL. $C_6H_5C:C.COONa=168{\cdot}037$.

Is supplied in 25% solution. Has been used in laryngeal and pulmonary tuberculosis by inhalation of 0·5 to 3% solutions. Note the treble linkage in the side chain indicating a more active body than the parent Cinnamic Acid.

Cinnaldehydum.—$C_6H_5CH:CH.COH=132{\cdot}0624$. *Syn.* **Cinnamal, P. Austr.**

Dose.—1 minim.

The aldehyde from cinnamon oil. A colourless liquid with cinnamon odour. Sp. Gr. 1·054 to 1·056. ***Soluble*** in alcohol in all proportions.

Capsules (Gelatin), 1 minim, have been used in malignant disease and in tuberculosis, especially in pulmonary cases.

Acidum Coumaricum.—*Syn.* ***o*-Hydroxycinnamic Acid.** $C_6H_4OH.CH:CH.COOH=164{\cdot}0624$. Brownish crystals, M.pt. 200° C., the meta-acid melts at 191° C., and the para- at 206° C. The use of this Hydroxy compound (as Sodium Salt) was a step forward from Cinnamic Acid as an

excitant of leucocytosis (*cf.* the superiority of Salicylic over Benzoic Acid. Further, ortho-coumaric acid stands in the same relationship to salicylic acid as cinnamic does to benzoic acid—introduction of the **Acrylic** grouping. *Soluble* very slightly in chloroform, in alcohol 1 in 12 or less, in ether 1 in 36, hardly soluble in water. The coumarates have action of vasodilators, and they may be taken for prolonged periods without harm.—Oliver.

Injectio Sodii o-Coumaratis. A 22% aqueous solution of Sodium *o*-Coumarate $C_9H_7O_3Na = 186{\cdot}0516$. Has been used in cancer and tuberculosis. *Dose.*—25 minims (**1·5 Cc.**), thrice weekly when possible between the growth and healthy subjacent tissues or in the course of lymphatics proceeding from the region of the growth, or over a large serous sac like the peritoneum. In glandular and early cases of pulmonary tuberculosis Drage reported good results. In cancer he held that few drugs exert more definite action. **Sterules** contain 25 minims of the injection; also made with **Kerocain** $\frac{1}{5}$ grain; also with **Kerocain** $\frac{1}{5}$ grain and **Adrenalin Solution** 10 minims. '**Fibrocoumarin**' **Sterules** contain **Sodium coumarate** injection 25 minims, **Thiosinamin** 2 grains and **Kerocain,** $\frac{1}{5}$ grain (suitable where tissue is cicatricised) also this formula with **Adrenalin Solution** 10 minims.

* **Tylmarin** (T.M. 283966). *Syn.* ACIDUM ACETYL-*o*-COUMARICUM. $CH_3COO.C_6H_4.CH : CH.COOH = 206{\cdot}078$.

Dose.—5 to 10 grains thrice daily after food. Colourless crystals, M.pt. 150° C. *Soluble* slightly in water, in alcohol 90% 1 in 19. In tuberculosis and as a general intestinal antiseptic. **Tylmarin Dusting Powder** has been used to cancerous growths which have broken down. Large open sores can be materially benefited.

Tylmarin Sodium. *Syn.* SODII ACETO-COUMARAS. $C_6H_4O.CO.CH_3CH : CH.COONa = 228{\cdot}0672$.

Dose.—5 grains. Decomposed in the stomach yielding Tylmarin in a nascent condition as initial product. Crystals readily *soluble* in water and in Alcohol (90%) 1 in 2.

Tylmarin-Quinine. *Syn.* QUININÆ ACETO-COUMARAS. $C_{20}H_{24}N_2O_2.C_6H_4O.COCH_3.CH : CH.COOH = 530{\cdot}2812$.

Dose.—3 to 5 grains. Contains approx. 60% Quinine and 40% Tylmarin, *soluble* very slightly in water, in Alcohol 90% 1 in 9, in Glycerin 1 in 30. Antiseptic and febrifuge.

Tylmarin-Thorium. *Syn.* THORII ACETO-COUMARAS. $Th(OH)_4[Th(C_6H_4O.CO.CH_3.CH : CH.COO)_4]_2 = 2404{\cdot}9636$.

A buff coloured powder containing approx. 35% of Thorium Oxide. Has radio-active power on a photographic plate. For local use in malignant disease.

Coumarin. *Syn.* COUMARIC AHNYDRIDE. $C_9H_6O_2 = 146{\cdot}0468$.

Colourless crystals with aromatic odour and taste contained in Tonquin beans from *Dipteryx odorata* (Willd.) and *D. oppositifolia* (Willd.). (*N.O. Leguminosæ*), also in Woodruff. It is made synthetically by boiling Salicylic Aldehyde with Acetic Anhydride and Sodium Acetate.

Soluble in alcohol, ether and oils, but not to any extent in water. Sublimes unchanged. One part will disguise the odour of 50 of iodoform.

Acidum Gallicum *Syn.* ACIDO AGÁLICO, F.E. VIII. $C_6H_2(OH)_3COOH + H_2O = 188{\cdot}0624$.

Dose.—5 to 15 grains. Crystals or crystalline powder of brownish colour Soluble in water about 1 in 100, in glycerin 1 in 12, in alcohol 90% 1 in 5. Properties and uses similar to Tannic Acid, *q.v.*

Acidum Hydrofluoricum $HF = 20{\cdot}008$. *Syn.* **Fluoric Acid** of commerce redistilled for medicinal use. Manufactured by the action of Sulphuric Acid on Fluor Spar (CaF_2) in lead or platinum vessels. It contains about 30% of the gas, emits suffocating fumes, and requires to be kept in gutta-percha or leaden bottles.

Bad burns may be produced in a delayed manner. Swelling of thumb and finger consequent on handling a cracked gutta-percha bottle of the acid. The skin became distended to bursting point with intense pain. Blisters were punctured. 1% Phenol compresses and later Normal Saline. Sodium Bicarbonate bath or preferably Ammonium Carbonate suggested as best treatment.—F. C. C. Robb, P.J. i./20,560.

Acidum Hydrofluoricum Dilutum. *Dose.*—5 to 15 minims. Contains 0·2%. Even thus diluted should not be kept in glass bottles for use. Has been given for goitre.

Ammonii Fluoridum $NH_4F = 37{\cdot}0392$. *Dose.*—4 grains may be considere more than a maximum.—W.H.M. (an experiment on himself for Sir Wm Gowers). This salt (soluble 5 in 6 of water) has been suggested to diminis enlarged spleen and in goitre in doses of 5 to 20 minims of solution, 4 grai in an ounce, after meals (supply in a gutta-percha bottle). For phthis inhalation from a 1 in 500 solution has been recommended.

Incompatible with Nitric Acid, Quinine Salts, Spirit of Nitrous Ether an soluble Calcium Salts, but compatible with Tinctura Ferri Perchloridi. **Calci Fluoridum.** $CaF_2 = 78{\cdot}07$. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ grain suitably diluted. Whit powder insoluble in water, has been advocated for improvement of the teet and building up bone. **Ferri Fluoridum. Ferric with Ferrous Fluoride** *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. A purplish grey insoluble powder, possessing hæmatini properties has been used for enlarged spleen. **Quininæ Fluoridum.** $C_{20}H_{24}N_2O_2$ $HF = 344{\cdot}211$. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. In relieving enlarged spleen and in rickets. **Sodii Fluoridum.** $NaF = 41{\cdot}997$. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ grain. Antisepti in phthisis. Active against *Staphylo* and *Streptococci* and *B. pyocyaneus* an fairly so against *B. aerogenes capsulatus*—*cf.* 'Specificity in Antiseptics *Vol. II.* Mixed with meal is a specific for killing beetles and cockroaches

Acidum Iodicum $HIO_2 = 175{\cdot}9398$. *Dose.*—1 to 5 grains.

White crystalline powder very soluble in water. Iodic acid is a remarkabl deodorant and preservative even in a 1 in 2,500 solution. It is employed i ozæna, for deodorising offensive urine, as an irrigant in empyema (strengt 1 in 500) and for leg ulcers, as a mouth wash, *e.g.*, in inoperable epithelic ma and as a throat swabbing in diphtheria. Found useful in extensive burnin (1 in 500 solution). Internally a drachm of a 1 in 100 solution, well dilute has been given in gastro-intestinal sepsis, as in typhoid fever. The calciu salt is principally employed.

Calcii Iodas. $Ca(IO_3)_2, 6H_2O = 498{\cdot}0376$. *Syn.* **Calcinol.**

Dose.—3 to 4 grains three times daily in solution.

Tasteless, odourless powder, soluble in 380 parts of water at 11·5° C. Act equally well in an acid or alkaline medium as a deodorant and anti-putrefactive A useful dusting powder. **Lotio Calcii Iodatis** (saturated aqueous solution is employed in septic and sappurating wounds. A warm saturated solutio is used as a **vaginal douche** or bladder irrigant; efficient as a mouth wash o gargle. Should prove useful in pyorrhœa alveolaris. An **ointment** 2% though specific in eczema. A solution or a 10% insufflation with bismuth carbonat may be useful in otorrhœa. May prove of value in fœtid breath.

Hydrargyri Iodas, $Hg(IO_3)_2 = 550{\cdot}474$. *Dose.*—$\frac{1}{6}$ to $\frac{1}{3}$ grain.

A white powder, strongly antiseptic. *Soluble* with the addition of Sodium Chloride to the extent of 2% in water. Potassium Iodide also assists solubility It attacks disease organisms with both its component ions, and contains only half as much Mercury as the Perchloride. In a pronounced sycosis of hairy parts of the face an ointment containing 4% effectual.

Sodii Iodas, $NaIO_3 = 197{\cdot}929$. 1½ grains in 5% solution (about saturated have been injected for acute and chronic articular rheumatism.

Zinci Iodas.—$Zn(IO_3)_2 = 415{\cdot}244$. White powder.

Soluble about 1 in 50. Use similar to the calcium salt.

Acidum Malicum. *Syn.* **Hydroxysuccinic Acid,** $C_2H_3(OH)(COOH)_2 =$ 134·0268. *Dose.*—1 to 5 grains. White deliquescent crystals soluble in water 1 in 1, and in Alcohol 1 in 1½. Has been used as throat spray in diphtheria and other throat affections. Possesses properties similar to Tartaric Acid. In phthisis much larger doses—up to 2 drachms have been given.

As an antiseptic, found to be specific against the gas bacillus (*B. aerogene capsulatus*).

Acidum Meconicum. $C_7H_4O_7, 3H_2O = 254{\cdot}078$. White crystals slightly soluble in water. Forms soluble salts with Opium Alkaloids. It occu in good opium to extent of 5 to 8%. Has little physiological action.

For method of assay of the Acid in the drug *vide* P. Van der Wielen.—P.J. ii./13.114. *cf.* also Vol. II.

As Meconic Acid readily forms a tri-sodium compound it was for long regarded as a tribasic acid. It contains, however, only two COOH groups and an additional OH enables it to form tri-compounds with stronger bases With alkaloids it only forms dibasic or monobasic salts. Although in boiling water it evolves CO_2 and becomes slowly converted into Comenic Acid, it may be dried on the water bath to constant weight losing only its water of hydration.—D. B. Dott, P.J. i./21,232.

Acidum Osmicum. $OsO_4 = 254{\cdot}8$.

Syn. OSMIUM TETROXIDE, HYPEROSMIC ACID. *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain.

In wax-like yellow crystals. Its vapour is intolerably pungent. Soluble slowly about 1 in 50 of water. It is poisonous and a powerful oxidizing body. It is used in microscopy; fat and medullary matter are blackened by it.

This and **Potassium Osmate** 1% solution in 2 to 10 minim doses have been injected hypodermically (painful) for neuralgia, for strumous glands, goitrous swellings, sarcoma, and cancer; also sciatica and muscular rheumatism, and given internally in epilepsy.

Liquor Acidi Chromo-Aceto-Osmici (Flemming's Strong Solution). Mix Glacial Acetic Acid 100 with Osmic Acid 8in water 400, and Chromic Acid 15 in water 1,500. Cancerous growths have been treated: 8 Cc. injections at edge of tumour, or 1 Cc. just beneath its surface. Also for fixing, in histology.

Ⓟ **Acidum Oxalicum.** $(COOH)_2 2H_2O = 126{\cdot}0468$.

'Poisonous—not to be taken'—Soluble Salts of Oxalic Acid.

In Gt. Britain and N. Ireland, Oxalic Acid is Ⓟ *and soluble salts of Oxalic Acid are in Section 5 of the* 1908 *Poisons and Pharmacy Act (Poinonous Substances): whereas in the Irish Free State Oxalic Acid and all Oxalates are* Ⓟ, *and therefore can only be sold by registered persons. In addition, soluble salts of Oxalic Acid must there be labelled 'Poison,' 'Poisonous,' and 'Not to be taken.'* *For further conditions of sale see p.* 38.

White crystals soluble in water about 1 in 9; a powerful poison, made by acting on wood, sugar, starch, etc., with Nitric Acid. The cerium and iron salts are used in medicine. A German patented process for production consists in passing Acetylene gas through Nitric Acid (S.G. 1·305).—P.J. i./25,13.

The toxicity of this acid in dilute solution and of its salts is due to their forming an insoluble calcium salt, a sufficient quantity of calcium in solution being essential for the welfare of the organism. Strong solutions of the acid are poisonous by corrosive action. Toxic symtoms and cardiac depression can be relieved by giving soluble Lime Salts.

Antidotes.—Apomorphine Injection, Calcium Saccharate Solution, Chalk, Castor Oil, Stimulants. ***Do not give alkalis, e.g., Soda or Potash which form soluble oxalates.***

Treatment with infusion of isotonic or hypertonic solution of Glucose has been successful as retention of urea seemed to be the principal disturbance.

Sal Limonis.—SALT OF SORREL or SAL ACETOSELLA, SALACETOS.

Commercial samples are mostly Potassium Quadroxalate, $K.H.C_2O_4.C_2O_4.H_2.2H_3O$. No evidence that Potassium Binoxalate, $KH.C_2O_4.H_2O$ (*Syn.* Acid Potassium Oxalate) is now a commercial salt.—I. A. Purdie, C. & D. i./25,198.

Is used for removing ink stains, iron mould, cleaning leather, etc., and removing the colour from calico printing. Has been given for scurvy. *Dose.* ¼ to ½ grain. Is very poisonous, with which word it must be labelled.

Acidum Succinicum.—$C_2H_4.COOH.COOH = 118{\cdot}0468$. *Dose.*—5 to 10 grains (0·3 to 0·6 Gm.).

Occurs on destructive distillation of Amber, as the oxidation product of a number of substances rich in carbon, *e.g.*, fats and fatty acids—treated with Nitric Acid. Also by fermentation of Malic Acid (Calcium Salt)—Liebig, or of Tartaric Acid, which is Dihydroxy-Succinic Acid.

Colourless crystals *Soluble* in Water 1 in 20, in Alcohol 1 in 9. **Ammonii Succinas.**—$C_2H_4(COONH_4)_2 = 152{\cdot}1104$. *Dose.*—2 to 5 grains. Crystalline salt soluble in water and alcohol. In spasmodic pains, particularly spastic contractions of the uterus. **Sodii Succinas.**—$C_2H_4(COONa)_2 + 6H_2O = 270{\cdot}1218$. *Dose.*—2 to 5 grains in catarrhal jaundice. Soluble 1 in less than 1·5 water. Has also been given in delirium tremens.—M.Am.

Potassii Succinas. $C_2H_4(COOK)_2 + 3H_2O = 248{\cdot}278$. A deliquescent powder; has been used in doses of 5 to 10 grains to control hæmorrhage. **Ferri Succinas.** Ferric Succinate, a reddish-brown insoluble powder, removes biliary calculi and relieves hepatic colic.

Acocanthera. *Syn.* TOXICOPHLŒA. Hottentot's Poison Bush. *A. Venenata* is employed in South Africa, here referred to. Probably contains Ouabain or allied glucoside. **Extractum Liquidum** (1=1) from the leaves. *Suggested dose* 2½ to 7½ minims, a substitute for digitalis.

℗ **Aconitum Laciniatum** is the probable source of Nepaul Aconite. *Syn. Bish* or *Bikh.*

℗ Tincture 1 in 8 of 90% alcohol. *Dose.*—1 minim hourly.

Adeps Præparatus *B.P.* '14.—*Syn.* ADEPS SUILLUS, AXUNGIA, **Ph. Ned. V.. Adeps Lotus P. Dan.**

The purified fat of the hog, *Sus scrofa* (Linn.)—from the 'flare' or 'omentum. contains 60% triolein (sold when separated by freezing and pressure as 'Lard Oil'), *v.* Sapones, *Vol. II.* The remainder is palmitin and stearin. *Soluble* in ether 1 in 22, hardly soluble in alcohol. **Adeps Induratus** is for use in the tropics. The liquid constituent is removed to a great extent by pressure. **Adeps Benzoatus** (*B.P.* '14) is made with 3% Benzoin. To be avoided as a basis for eye ointments.

Adonis vernalis (P. Austr., Ph. Ned. V.).—Contains a hygroscopic glucoside Adonidin which resembles Digitalis in action. *Dose.*—In powder, 3 to 6 grains; of infusion 1 in 40, 4 drachms; of Adonidin, $\frac{1}{4}$ to $\frac{1}{2}$ grain daily. Epilepsy has been treated with it combined with Bromide. **Tincture.**—Leaves and Stalks employed 1 in 10.—*Dose.*—10 to 30 minims. Adonidin is a local anæsthetic. In chronic glaucoma, iritis, and irito-cystitis 1% solution has been used, 3 drops relieve pain.

Five mgr. of **Adonidin** in 0·5% solution an efficient diuretic in cardiac anasarca.—per Y.B.P., '27,218. See also Y.B.P., '26,237.

Adonite, a sugar ($C_5H_7(OH)_5$), occurs in the plant. The crystals have sweet taste, are very soluble in water, less in spirit. M.pt. 102° C. It is employed as a Bacteriological Sugar in fermentation reactions—*cf.* Vol. II., B. Typhosus.

Æsculus Hippocastanum.—Horse-Chestnut. Marron d'Inde FR. CX. NOUV. SUPP.-26. Tincture of Seeds 1 in 10 proof spirit has been given for painful hæmorrhoids. *Dose.*—10 minims night and morning. Also emmenagogue. A liquid extract has been used, painted on or rubbed in, in rheumatism and neuralgia. **Kastanol.**—Extractum Hippocastani Liquidum with 8% camphor: used in rheumatism.—(Austria.) Ph. Notes.

Chestnuts contain from 21 to 47% of Starch and Acorns from 55 to 57%, the total sugar in addition being 11 to 19 and 6 to 9% respectively. On hydrolysis with acids about 30 gallons of absolute alcohol could be obtained from a ton of nuts.—L. ii./17,757.

Æsculin, $C_{15}H_{16}O_9.1\frac{1}{2}H_2O = 367{\cdot}1482$, a glucoside, soluble in water, to which 2 to 3% Sodium Carbonate is added, also soluble in alcohol. Solutions have a blue fluorescence, and have been used similarly to Quinine in X-ray and Finsen light treatment (*q.v.*). *Dose.*—1 to 5 minims of 5% solution.

An ointment containing Æsculin used for prevention of sunburn.—Pres. July, '26,285. We have prepared an ointment 2% strength in yellow paraffin which has been tested by ultra violet light and found to be effectual. Other bases, *e.g.*, soaps, etc., not satisfactory.

Alcoolature Stabilisée suggested by the late Professor Bourquelot. In the case of horse chestnuts, Alcohol of 75% strength is employed for stabilisation and extraction. See also Valerian.

Castanea vesca, the ordinary SWEET SPANISH CHESTNUT. Infusion 1 ounce of dried leaves in 1 pint boiling water. *Dose.*—$\frac{1}{2}$ ounce to a wineglass 3 or 4 times daily, or better $\frac{1}{2}$ to 1 drachm of fluid extract every 3 to 4 hours. For whooping cough.—E. M. Holmes, P.J. i./30,158.

Æthusa Cynapium.—Fool's Parsley, Lesser Hemlock. Contains a small amount of volatile alkaloid, with the properties of Conine; calculated as hydrochloride constitutes 0·0003% of the entire fresh herb. A larger proportion under favourable conditions, may be produced leading to poisonous properties. It also contains a volatile oil, 0·015% of the entire fresh plant and resin 0·8%. Has narcotic properties. Garden Parsley, *vide* Apiol.

Æthyl Bromidum. P.G. VI, FR. CX., P. JAP., P. HELV. ÆTHANOLI BROMIDUM, P. BELG. IV, F.E. VIII, P. ITAL. V. C_2H_5Br. *Syn.* HYDROBROMIC ETHER.

A colourless, very volatile liquid with a strong peculiar odour and a sweetish warm taste, becoming brown by exposure owing to decomposition, bromine being split off. It has Sp. Gr. 1·4735 and boils at 38·8° C. P.G. dilutes with spirit to improve keeping properties. *Soluble* 1 in 85 of water and miscible with alcohol 90% and ether.

For *local* anæsthesia it may be used as spray, or simply short covered contact for neuralgia. It may be added to Menthol Liniment. **Somnoform** (*q.v.*) contains 5%. **Ethyl Bromide Sterules.** Encased in cotton wool and rayon, contain 5 minims in each; are convenient for use when crushed. Useful in asthma and epileptic convulsions.

Ethylene Bromide.—$C_2H_4Br_2 = 187{\cdot}8632$. *This is poisonous—distinguish*

from the above. *Dose.*—1 to 2 minims in alcoholic solution or oily solution hypodermically or in Gelatin Capsules. A colourless liquid, of Sp. Gr. 2·163, soluble 1 in 4 of 90% alcohol, insoluble in water. Reduces frequency and intensity of attacks in epilepsy.

Agar-Agar—Japanese Isinglass. P.G. VI, U.S. X, P. Svec. X, P. Jap. IV., F.E. VIII Membrane-like strips, *i.e.*, the dried jelly of *Gelidium corneum*, a sea-weed, and other species. *G. corneum* is collected in Japan from the rocks between May and October, and dried and cleaned by alternate wetting and drying in the sun. It is then extracted with boiling fresh water and the liquor strained off, filtered, and cooled, and dried in wooden trays.—P.J. ii./26,372.

1 in boiling water 200 forms on cooling a transparent jelly, suitable for invalids. It has little nutritive value—it is not digested—but is useful for treating constipation, especially of the type where the stools are hard and dry owing to complete absorption of liquid from the digestive tract. For this purpose it is best crushed into small pieces like bran—termed **Flaked Agar.** Clinical experience shows that finely powdered or even sand-like powder is not efficacious. Teaspoonful doses occasionally of the dry substance in flake form sprinkled in little moist food, *e.g.*, stewed apples, act as mild aperient in that it softens the fæces, but should be employed at first in moderation, as it may possibly cause obstruction. By taking up moisture it increases the volume of the fæces and promotes peristalsis.—*See* Cascara Jelly also. It is used in preparation of culture media for bacteria (*q.v.*); also for finishing calicos, silks, etc.

Production of Agar.—P.J. ii./26,372.

Agar-Agar—detection and estimation.—J. King, Analyst, 1925.

Vanilla, Almond and **Raspberry** flavoured **Flaked Agar** are prepared.

Linseed appears to act, as regards weight yield of fæces, better than Agar-Agar.—88% increase against 48%, but not so well as Psyllium, 97%. Did not depend on humidity.—B.M.J.E. i./14,59.

✱**Thaolaxine** (T.M. 319983), described as Agar-Agar with Rhamnaceous Extracts, in form of Scales, Cachets, Tablets and Granules. A laxative in treatment of chronic constipation.

✱**Jubol** (T.M. 313263). Tablets of Agar-Agar with biliary and intestinal glands extract. *Dose.*—3 tablets at bedtime.—Gehe.

✱**Paraffagar** and other preparations with liquid paraffin are prepared, *q.v.*

Agaricus Albus.—*Syn.* Polyporus Officinalis, Boletus Laricis, Fungus Laricis (P. Austr.), P. Ital. V. **Polypore de Melese** (Fr. Cx.). Purging Agaric. *Dose.*—10 to 30 grains. Light, spongy pieces. Large doses purgative, small ones astringent for night sweats, diarrhœa and to diminish bronchial secretion. Tincture 1 in 10 of 60% alcohol. *Dose.*—20 to 60 minims. Extract—*Dose.*—½ to 2 grains. Prepared by exhaustion with 60% Alcohol, yield is about 6%.

Not to be confused with the fly agaric, Amanita Muscaria, which contains [P1]**Muscarine** and Synthetic Muscarine or Choline Nitrous Ether. See Edn. XVIII, p. 808.

Constitution of Muscarine being studied by M.R.C.—B.M.J. i./30,560.

Acidum Agaricum. Agaricin P.G. VI, Ital. V, Helv. and Jap. and Dan. $CH_2C(OH)(CH)(C_{16}H_{33})(COOH)_3 1\frac{1}{2}H_2O$. *Syn.* Laricic Acid.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain is given to restrain the sweating of phthisis. Max. single dose (P.G. VI and Ital.) 1½ grains.

Agrimonia Eupatoria (*Rosaceæ*).—Common agrimony. Mild astringent.

Elixir Agrimoniæ Compositum (Lunan). A special preparation of agrimony, rhubarb, toad-flax (*Antirrhinum Linaria*), barberry, caraway, chamomile, dandelion, parsley, is in demand in incipient appendicitis; stated to avert an operation, and in any condition of the stomach and alimentary canal likely to produce inflammatory symptoms. *Dose.*—1 drachm in water thrice daily; as hepatic stimulant: mild astringent. **Mistura Agrimoniæ Composita.** *Dose.*—½ ounce thrice daily, is of similar composition for gall-stones, and to prevent their formation—stated to prove effectual.

Agropyrum, Triticum (*B.P.* '14) or Couch Grass. Dried rhizome of *A. repens* (*Triticum repens*). Contains triticin, a carbohydrate similar to inulin. Useful in gonorrhœa. Diuretic and aperient.—Pg. I. iii. 50. **Decoctum** (*B.P.* '14). *Dose.*—½ to 2 oz. Prepared with Water, 1 in 20. **Ext. Liq.** (*B.P.* '14). *Dose.*—1 to 2 dr. Made 1=1 with boiling water, and 25% of Alc. 90%. *Flavouring.*—Syl Lavandulæ; Aqua Anethi.

Triticum Repens (genuine) is a commercial rarity. The chief, if not the

only substitute is the rhizome of *Cynodon Dactylon*, the dog grass. Spain apparently the geographical source of the material of commerce.—J. Small B.P. Conf., 1919.

Alchemilla Arvensis (*Rosaceæ*). Parsley Piert. Small annual plants wit green flowers. Is superior to buchu in some instances. Infusion of leave 1 in 10. *Dose.*—1 to 2 ounces.

Aletris Farinosa, B.P.C.—Star Grass, Colic Root, (Dioscorea *q.v.* is als called Colic Root). From the rhizome of this are prepared a fluid Extra with diluted alcohol, U.S. (1890, 1=1). *Dose.*—5 to 15 minims, and a Cordi or Elixir (B.P.C. containing Liquid Extract of Aletris 25, Liquid Extract Liquorice 6, Simple Elixir 45, Water to 100). *Dose.*—½ to 1 drachm, a used as uterine tonics. **Extractum Aletridis Liquidum, B.P.C.** 1=1 b percolation with Alcohol 45%.

Alginoid Iron. *Syn.* ✱ALGIRON (T.M. 283697). *Dose.*—2 to 15 grain Alginic Acid from seaweed is combined with iron, forming an insoluble brow powder containing about 11% of iron. Does not constipate: is given f anæmia. Pills and pellets are prepared. Also compound pills with Extra Cascara ⅛ gr.; ℙ Arsenic $\frac{1}{100}$ grain; ℙ with Arsenic $\frac{1}{100}$ grain and Stryc nine $\frac{1}{100}$ grain.

Allium Sativum.—Garlic bulb (*Liliaceæ*). *Dose.*—½ to 2 drachms. Garl preparations have been given in pulmonary phthisis and bronchiectasis. Th are useful in cases of dilated bronchi with fetid expectoration. **Succu** *Dose.*—10 to 30 minims. **Extract**=inspissated juice. *Dose.*—4 to 10 grain Pill contains 4 grains extract.

Oleum Allii Essentiale—This Oil is excreted through the lungs and skin— not apparently by the kidney. Its principal constituent is usually taken t be Allyl Sulphide $(C_3H_5)_2S=114{\cdot}144$. Stimulant, expectorant and stomachi In chronic bronchitis, pneumonia, also in cholera and tuberculosis, All Sulphide can be made by interaction of Alcoholic Potassium Sulphide wi Allyl Iodide. *Dose* of either the Natural Oil or Allyl Sulphide, ½ to 2 minim in **Capsules,** ½ minim of Allyl Sulphide per kilo weight may be taken as leth dose.

Laryngeal tuberculosis treated by ½ to 1 drachm, two or three times a da of the Garlic Juice with Tinct. Lavand. Co. and Syrup. Simplex, also gargle spray (or combined), or for internal use, accompanied by poultice (or blist of pulped garlic externally—latter also to tuberculous ulcers. Fresh jui is not so severe in action as the pulped garlic. The juice should never b applied to broken surfaces. Lengthy application of poultices (3 to 4 wee with changes) may be required, but effect should first be tried for a few hour as some are more susceptible than others. It was held by W. C. Minchi who advocated the treatment, that Allyl Sulphide is specific in all tuberculo lesions in accessible situations, or in those which can be rendered accessibl Thus, every case of tuberculous disease in the leg, foot, arm, hand, testicle, et gets well under Allyl Sulphide treatment. Allyl Sulphide certainly has fai high germicidal power, *cf.* Vol. II, *Carbolic Coefficients.*

The following were finally adopted as modes of treatment:—

Emplastrum Allii.—Fresh garlic *q.s.*, pulped, 2 lbs., to this add ½ lb. la warmed to a cream, and mix thoroughly. Spread on thin butter-muslin a apply to the part, changing the dressing about every 24 hours.

Unguentum Allyl Sulphidi, 0·1%—increased in strength if desired—in Oleu Anseri Benzoatus, could replace above as being more expeditious to prepa

Inhalation.—Fresh Garlic Juice 56, Alcohol (90%) 7, Eucalyptus Oil (*v* Citriodora) (Bayard) 1. 4 ounces is sufficient for three weeks' treatment pulmonary tuberculosis. The juice is *fresh* and *not filtered.* Patient to u inhaler in a respirator at least 1 hour night and morning. **Capsules of Al Sulphide,** 2 minims, can be used in addition if practicable.

For lupus apply the fresh juice at night and allow to dry, wash off in morni and apply a bland ointment.

Suppuration of wounds controlled by Succus Allii diluted with 3 or 4 par Distilled Water. Notable improvement in 48 hours. A case of empye remarkably cleaned out with this lotion. Stronger than this (1 with 2 water) caused pain. Later 1 with 9 of water used when suppuration definit controlled.—V. Gabriel, L. ii./15,603.

Whooping Cough has been treated by Garlic juice *per os.*—T. Mark Hove B.M.J. ii./16,15; i./17,284.

Duodenal ulcers have been successfully treated by rectal injection of the juice diluted with three times quantity of water.

Hydrarthrosis has been cured by placing the fleshy scales of the onion round the joint and keeping in place with a bandage.

Gangrene of the lung treated by 20% Garlic Tincture.—Pr., June, '22,443.

Allylene (Zambeletti). A preparation for intramuscular injection, and in pill form, in phthisis; also combined with Tuberculin.

Allium Cepa, the ordinary onion, is of less strength than Allium Sativum.—P.J. i./20,345.

Allium Porrium.—The common leek also contains Allyl Sulphide.

Alnus Glutinosa.—The common Alder. *Uses.*—Astringent and tonic. Contains about 20% of Tannin. **Liquid Extract.**—1=1 of the bark. *Dose.*—10 to 30 minims. Made by percolation with 45% Alcohol. Set aside the first portion, percolating (¾ of the whole), and continue percolation with remainder of the Alcohol, concentrate and add to reserve portion. Was advocated in cancer. A Liquid Extract of the leaves, prepared by boiling with water and adding Alcohol *q.s.* to preserve, has also been used. In 140 cases of cancer, pain, cachexia and exhaustion diminished.

The author has also made an Extract from the fresh leaf by **Gray's method** (see Medical Magazine, May, 1907, modified by a private communication) **(June, 1931) of strength 3=5 of fresh leaf. The leaves were finely minced** and extracted with water at not exceeding 80° C. On concentration to a syrup Glycerin added to the extent of 33% (*i.e.*, content of 25%), as preservative.

Alstonia constricta, *B.P.* '14.—Bark used in Australia as a febrifuge. *Dose,* in powder, 5 grains. A crystalline alkaloid, Alstonine or Chlorogenine. $C_{21}H_{20}N_2O_4,3\frac{1}{2}H_2O=427{\cdot}2266$, has been isolated from it, Tincture, 1 in 8 Alcohol 60%. *Dose.*—½ to 1 drachm. Should be less, 5 to 20 minims. Influenza has been treated by Tincture in 10 minim doses. Three other alkaloids exist in it. A mild diaphoretic. When prescribing the tincture that of *A. constricta* should be specified.

Alstonia scholaris, *B.P.* '14.—Dita bark, from India and the Philippines, contains amongst others an alkaloid, Ditaine, *syn.* Echitamine, $C_{22}H_{28}N_2O_4$ and the milky juice of the tree forms a substance resembling gutta-percha. Tincture, 1 in 8 Alcohol 60%. *Dose.*—¼ to 1 drachm.—These two drugs are under one monograph. **Infusion.**—1 in 20 boiling water. Tonic in malaria, in chronic diarrhœa and advanced stages of dysentery.

Althæa. Marshmallow, dried root of *Althœa officinalis* (*Malvaceœ*) from second year's growth and deprived of the periderm. Contains Asparagin, *q.v.* Is mucilaginous and used in pill making to give 'body.'

Amadou.—Oak agaric, Surgeons' agaric, Touchwood. *Polyporus fomentarius* L. A fungus prepared with alkali and nitre, in light brown elastic pieces employed as a mechanical hæmostatic. It is included in P. Austr. under the name *Fungus igniarius.*

Ambergris.—A substance found floating on the surface of the sea—in southern hemisphere, valued for its perfume which is generated on keeping in a closed receptacle for a year or so, generally believed to be an intestinal product from the sperm whale.

A sample, 'possibly genuine,' had M.pt. 75° C. with a small amount of substance which did not melt at 100° C. It was of grey colour with little odour. It was soluble to extent of 93·8% in Petroleum Ether which extract had Ref. Index (70°) 1·495, Iodine No. 107·1, Acid value 1, Sap. No. 4·4; this portion presumably containing the Ambrein was soluble in absolute Alcohol on warming and melted to a clear sticky amber liquid at 42° C.—all of which figures are scarcely those of the adulterant ozokerite.—Evans' Anal. Notes.

Amylene. *Syn.* Iso-Amylene. $C_5H_{10}=70{\cdot}078$.

Amyleni Hydras. *Syn.* DIMETHYL-ETHYL CARBINOL, TERTIARY AMYL ALCOHOL $(CH_3)_2:C(OH)C_2H_5=88{\cdot}0798$. *Dose.*—30 to 80 minims, flavoured with liquorice. Ph. Ned. V., P.G. VI. has maximum single dose 4·0 Gm. Maximum in 24 hours 8·0 Gm.

A colourless liquid, of pungent taste and odour, resembling a mixture of paraldehyde and camphor. Soluble in 8 parts of water, also in alcohol. Sp. Gr. 0·815 to 0·820, B.pt. 216° F. Hypnotic, occupying a position between chloral and paraldehyde. **Capsules** contain 10 minims in each. *Dose.*—3 to 6. 3 drachms suspended with Tragacanth Mucilage ½ ounce, flavoured with Licorice and made up to 2 ounces for the dose, have been given as a night draught.

Amylene-hydrate Carbamate. $NH_2.CO.OC(CH_3)_2.C_2H_5 = 131{\cdot}1094$. *Syn.* ✱**Aponal** (T.M. 339355).

Dose.—15 to 20 grains (30 max.) mild hypnotic. Stated to induce easy and calm sleep in 20 to 30 minutes, also to be free from ill effects on gastro-intestinal tract or other organs. In insomnia due to nervous debility.

Said to be made by action of Urea Hydrochloride on Amylene Hydrate (Dimethyl-ethyl-carbinol).—P.J. ii./11,442; B.M.J. i./12,733.

Amylum.—Starch is obtained from the common wheat (*Triticum Sativum*), maize (*Zea Mays*), rice (*Oryza Sativa*) and potato (*Solanum Tuberosum, N. O. Solanaceæ*).

Tapioca Starch. *Syn.* Manihot, Manioca or Mandioca Starch, from Brazil, may form a commercial competitor of the varieties in use.

Starch and its structure.—Prof. Larg and co-workers, P.J. ii./27,398.

Anacardium occidentale.—Cashew Nut. The pericarp of this contains a vesicating oily liquid, which consists of 10% of Cardol (to which the vesicating properties are due), and 90% of Anacardic Acid, $C_{22}H_{32}O_3 = 344{\cdot}256$. The oil has been used in leprosy, ringworm, ulcers, corns and internally as a vermifuge. Tincture, 1 in 10 Alcohol 90%. *Dose.*—2 to 10 minims. **Anacardii Folia** were in **Ph. Ned.** The marking nut, from *A. Officinarum*, possesses similar properties.

Ananassa Sativa (Pine Apple). Has been used among the natives in South Africa for diphtheria and diphtheritic sore throat.

The fresh fruit juice contains an active proteolytic enzyme, Bromelin, which is destroyed when the juice is heated, or the fruit is canned. Bromelin digests 1,000 times its weight of protein in a few hours and operates equally well in acid, alkaline or neutral medium.—S. G. Willimott, P.J. ii./28,219; I. ii./28,455.

Tinctura Ananassæ (Sativæ). *Dose.*—(As digestive) 25 to 30 minims with meals, is prepared by macerating Ananassa Sativa 1 for three weeks in Alcohol (90%) 1¼, adding Glycerin 2 and making up to 4 with Alcohol 90%. After tonsillotomy, painted or sprayed on, prevents the formation of membranous looking exudation, and the stump heals in a few days. Useful in chronic tonsillar abscess. Has been used for dissolving necrosed tissue in quinsy, tonsillitis, boils, etc.

Butyric Ether $C_3H_7CO.OC_2H_5$. *Syn.* **Ethyl Butyrate**, has odour of pineapple. Sp. Gr. 0·9 nearly. B.pt. 120° C. Diluted 1 in 20 or 1 in 10 in spirit is used as pineapple essence.

Anchusa Officinalis (*Boraginaceæ*). **Alkanet**, causes the heart to stop in diastole, it yields 5 to 6% red amorphous resin "Alkannin," and contains two red substances, has some relationship to action of Curare.—L. i./06,974.

Equal parts of Alcohol 90% and Benzene (Benzol Cryst.) used for evaluation of Alkanet Root, comparing with a standard.—W. A. N. Markwell and L. J. Walker, P.J. ii./30,429.

Anethi Oleum.—Distilled from fruit of *Peucedanum graveolens*. It is a yellow oil with odour resembling caraway. Sp. Gr. 0·900 to 0·920 approx. Soluble 1 in 3 of 90% alcohol. Some normal distillates of dill-fruit have lower Sp. Gr. than 0·905, but, since the oil is for medicinal purposes, and the carminative principle is carvone, a high proportion of the latter should be ensured by the minimum Sp. Gr. indicated. English Dill Oil varies in Carvone content, and in its physical constants with different seasons.—Finnemore. A high Sp. Gr. should put the analyst or user on his guard for admixture with caraway oil.

Anhalonium Lewinii.—Mescal Buttons, the tufts of young leaves of the plant are eaten by the Mexican Indians to produce intoxication accompanied by visions. Effects due to alkaloids, *e.g.*, [P1] Mescaline.

A liquid extract of commerce diluted, on an empty stomach, had no effect in 50 minims. 100 minims, however, in 15 minutes produced slight dyspnœa and transient headache, then intermittent tetanoid spasms in hands and feet with sensation of 'delightful feeling of irresponsibility.'

Review of Lewin's work, E. White's and Prof. Dixon's researches. In U.S.A. its use is prohibited. Has been used in neurasthenia and hysteria and in asthma (Therap. Gaz., 1888).—H. B. Figg, P.J. ii./31,240.

An interesting account of the physiological and psychological effects produced.—D. N. Buchanan, M.A., 1931,12.

Visual phenomena from Mescaline Sulphate 0·2 Gm. doses. Hallucinations—carpets with dots—meadows of buttercups and daisies—chairs revolving or

their own axes. Mescaline addiction in the great cities of Europe. Macdonald Critchley, Prof. Dixon, L. ii./30,863; B.M.J. ii./30,690.

Anisi Fructus (*B.P.* '14). Anise. Dried ripe fruit of *Pimpinella Anisum*, Linn. (*Umbelliferæ*). Contains **Oleum Anisi** which is also distilled from the Star Anise (*Illicium verum*, *N.O. Magnoliaceæ*), the latter being that used almost entirely in this country. *Dose.*—½ to 3 minims. Aromatic and carminative. Colourless or yellowish oil congealing between 10 and 15° C. Sp. Gr. at 20° C., 0·975 to 0·990. **Aqua Anisi.**—Anise Fruit 1 pound, Water 2 gallons. Distil 1 gallon. **Spiritus Anisi.**— 1 in 10 in Alcohol 90%. *Dose.*—5 to 20 minims.

Eau de Botot—Anise Oil 20, Peppermint Oil 13, Saffron Tincture 5, Alcohol 70% to 1,600. Some formulæ contain Cinchona, Rhatany, Cloves, etc.

Anethol (P. Belg. IV., P. Austr., P. Jap. III). $C_{10}H_{12}O$=148·1436. The Stearoptene from the Anise Oils melts at 20° C., B.pt. 230° C. Soluble in Alcohol 90% 1 in 3 approximately. *Dose.*—½ to 2 minims.

In infantile colic give 2 minims of Anise Oil followed by a drachm of castor oil.

Anthemis nobilis (*Compositæ*).—*Syn.* 'English' or 'Roman.' Chamomile Flowers. The largest, most 'double,' and whitest flowers are preferred. Tonic, aromatic, stomachic, emetic in large doses. In addition to the Extract, *B.P.* '98, *dose* 3 to 8 grains, Infusion, and Oil, a Tincture, 2 of single fresh flowers in Alcohol (90%) 3, and Water 1, are made. The latter is used for summer diarrhœa of children. *Dose.*—3 to 10 minims.

Oleum Anthemidis.—Distilled from the flowers of the Roman chamomile. Sp. Gr. 0·905 to 0·915 (*B.P.* '14). Soluble in less than its own vol. of 90% alcohol.

'German' Chamomile Flowers are those of *Matricaria Chamomilla*. They have a hollow conical receptacle and no bracts, whilst *A. Nobilis* flowers have solid receptacles and are covered with concave, blunt, narrow bracts.

Anthemis cotula. 'Mayweed,' common in the fields, caused a bullous eruption.—J. H. Sequeira, L. ii./21,560.

Anthoxanthum odoratum.—Sweet Vernal Grass. Flowers develop odour of coumarin on drying. Tincture, 1 of fresh-flowering herb in 10 of 40 O.P. spirit (making allowance for the moisture the plant contains). *Dose.*—2 to 6 minims internally and diluted as a nasal lotion for hay fever.

Apis Mellifica.—The Honey Bee. A Tincture. *Dose.*—1 minim hourly, is said to relieve urticaria. See also Acid Formic.

Apocynum. American Indian Hemp Root. U.S. VIII. *Syn.* Apocynum Cannabinum. Canadian Hemp. *Average dose* (of root in powder) 15 grains. *Does not contain Alkaloid and is not in Poisons Schedule, but caution : a powerful drug.* Stated to be a rapid and efficient cardiac stimulant, also an active diuretic occupying a place between Digitalis and Caffeine, non-cumulative. A powerful emetic, diaphoretic, cathartic and anthelmintic, and diuretic, employed in cardiac dropsy and Bright's disease. The active principle is said to be a crystalline non-glucosidal substance called variously **Cynotoxin** and **Apocynamarin.**

Tinctura. 1 in 10 of Alcohol 60%. *Dose.*—5 to 60 minims. The tincture (10%) is about 1½ times more toxic than Tinctures of Digitalis and Squill, and nearly six times less toxic than the Tincture of Strophanthus (*i.e.*, the *B.P.* '98 Tincture which was ¼ as strong as the *B.P.* '14). Produces its diuretic effect best on patients with cardiac disease and a failing heart. Ranks next to Strophanthus as regards toxicity to frog's heart and it is more toxic than digitalis and squill. No special difference in action on the kidneys, but apocynum is most likely to produce hæmaturia owing to its irritant properties. —L. i./10,81. Uræmia is warded off by the profuse diuresis it produces and it is of use in removing pleuritic effusion. **Decoctum** 1 in 60. *Dose.*—½ to 1 ounce.

Fluidextractum, U.S. VIII. *Dose.*—15 minims. 1=1 glycero-hydro-alcoholic. Useful in dilatation of heart, mitral, and other valvular lesions.

Apocynum rhizome varies enormously. It had a great reputation among the aborigines and early settlers for dropsy. There was confusion and substitution. Good Apocynum is many times more active than Digitalis as a heart stimulant.—H. H. Rusby, P.J. ii./29,312.

Arachis Hypogœa. (*Syn.* Pea Nut, Ground Nut, Goober Nut, Manilla grain, Chinese Almond.)—The seeds of the plant form the 'pea nuts' of commerce. Have dry, brittle envelope and yellowish-white kernel. Very rich in a non-drying oil (40 to 50%) which is *B.P.* '14 with Sp. Gr. 0·916 to 0·921. Ground

down they are employed as cake for cattle. Eating the kernels causes a desire to drink.—L. i./17,670.

Emulsio Olei Arachis cum Glucose. Gt. Orm. H.

Pea Nut Oil 15, Saccharated Lime Solution 4, Gum Acacia 2½, Oil of Cassia 1/40, Oil of Cloves 1/40, Chloroform 1/10, Liquid Glucose 30, Decoction of Irish Moss to 60.

Arbutin. $C_{12}H_{16}O_7+\frac{1}{2}H_2O=281{\cdot}1326$.—A crystallised glucoside obtained from the leaves of *Arctostaphylos Uva-ursi* (*Ericaceæ*) U.S. X. (Fluid-extractum 1=1 Glycero-hydro-alcoholic). *Dose.*—Average 30 minims. Bearberry, and other ericaceous plants. Soluble 1 in 8 in cold water. It is given for chronic cystitis and vesical catarrh, in dose of 5 to 15 grains with sugar; is not poisonous. Infusion (*B.P.* '14) 1 ounce to 1 pint of boiling water. Antiseptic; also as vermifuge for dogs 60 to 100 grains. Arbutin, given *per os* is partly decomposed with formation of Hydrokinone, but most of it is absorbed by the kidneys.—Dixon.

For preparation of True Arbutin see Edn. XVII, p. 781.

Busserole Fr. Cx. = Uva Ursi Folia. *Average dose* (U.S.) 30 grains.

Infusum Uvæ Ursi Concentratum, B.P.C. by *b.* process under Infusa Concentrata. *Dose.*—½ to 1 drachm.

Areca, Semen Arecæ, P.G. IV, Betel Nut. B.P. Add. 1874.—From *Areca Catechu* (*Palmaceæ*). *Dose.*—1 to 4 drachms. Is astringent, and is used as a vermifuge, especially for dogs; is also used as a masticatory and added to dentifrices. Contains several alkaloids, the most active being ℙ **Arecoline** (about 0·1%). $C_8H_{13}NO_2=155{\cdot}1094$, a liquid which forms a crystalline soluble ℙ **Hydrobromide,** P.G. VI, Fr. Cx., P. Helv., P. Hung., P. Bor. VII, P. Svec. X., F.E. VIII, $C_8H_{13}NO_2$,HBr. Fr. Cx. gives maximum single dose 0·0005 Gm. ($\frac{1}{120}$ grain approx.) and maximum daily dose 0·0015 Gm. ($\frac{1}{40}$ grain), approx. Its physiological action is allied to that of pelletierine and pilocarpine. It is sialogogue and diaphoretic. Resembles physostigmine as a myotic, 1% solution suitable. Serviceable in glaucoma. The Alkaloids have been chemically examined.—J.C.S.A., Feb., 1919, p. 93.

Betel Nut Chewing. The ingredients are betel leaf, areca nut, black catechu, lime, turmeric, paste and tobacco leaf. Details as to betel nut (oral) carcinoma. In Siam betel nut chewing is more done by women than men. The habit prevents decay of teeth, but leads to chronic changes of mucous membrane of the mouth, causing loosening and loss of teeth.—A. G. Ellis, B.M.J. ii./21,808; Jl. Trop. Med., June 1, '22,149.

Tenaline, a liquid specialty, used in veterinary practice: is an efficient vermifuge. *Dose.*—1 minim for each pound of the weight of the dog.

Arnicæ Flores (*B.P.* '14).—*A. montana.* Dried flower heads. Acrid stimulant equivalent in effects to Arnica rhizome. **Tinctura.** *Dose.*—½ to 1 drachm. 1 in 10 Alcohol 70%.

Arnica dermatitis.—Arnica often used by the public for bruises and injuries, but may produce dangerous rashes. Under saline purges and sedative ointment rash and irritation subsided.

Arnica Root found adulterated with the roots of *Asclepias vincetoxicum*, distinguished by yellow colour of section, large Calcium Oxalate cells and small starch grains.—Per P.J. ii./25,312.

Arum Maculatum.—The berries of the plant known as 'Lords and Ladies' act as an irritant poison causing excoriation of the mouth and sometimes bleeding and convulsions, and the tongue sometimes swells so as to fill the mouth and prevent swallowing. The swelling is best reduced by bleeding. For further details of the plant see a description by E. M. Holmes.—P.J. i./15,324. **Succus Ari** prepared from the leaves. *Dose.*—1 drachm. Has been used in neuralgia.

Asafetida.—Gum resin obtained by incision from the root of *Ferula Fœtida* and probably other species. Coat pills first with mucilage and afterwards with Pill Varnish to cover the odour—not with silver, which would blacken. Nervine stimulant expectorant and carminative. **Emulsum Asafœtidæ,** U.S. Asafœtida 40, Water to 1,000. **Enema Asafetidæ,** L. H. Tincture of Asafetida, ½ ounce. Starch Enema to 4 ounces. **Tincture** (*B.P.* '14), 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm. U.S. 1 in 5. *Average dose.*—15 minims. ***Flavoring.***—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri. Syrupus Zingiberis not much good. **Liquor Antihystericus.** *Dose.*—½ to 1 drachm. On the Continent a mixture is used of Camphorated Spirit of Ether and Asafetida Tincture equal parts.

Threatened appendicitis. Flatulent distension often remarkably improved by moderate dose of castor oil combined if necessary with enemata of Turpentine and Asafœtida. Change in iliac swelling is often effected.

Chemical details on Asafetida XVIIth Edn., p. 782.

Asclepias incarnata.—White Indian Hemp rhizome. Is a speedy, potent and reliable diuretic.—Pr. xxiii. 141. Tincture, 1 in 10. *Dose.*—5 to 40 minims.

Asclepias tuberosa.—Pleurisy Root. Is expectorant and diuretic. Tincture, 1 in 10. *Dose.*—5 to 40 minims.

Asparagin. *Syn.* ALTHEIN. Amido-Succinic Acid Amide $C_2H_3(NH_2)(COOH)$. $(CONH_2)$, $H_2O = 150{\cdot}094$. *Dose.*—1 to 2 grains. White crystals, having a slight acid reaction. May be obtained from *Asparagus officinalis*, and the roots of liquorice, belladonna, etc. Soluble 1 in 50 of water, also in acid and alkaline solutions. Insoluble in absolute alcohol and ether. An aqueous solution dissolves freshly precipitated mercuric oxide, and this has been used for hypodermic injection in syphilis. Has decided diuretic effect. For cardiac dropsy and chronic gout one grain is given three times a day.

Aurantium. Aqua Aurantii Floris (*B.P.* '14), **Aqua Naphæ, Ph. Ned. V.** *Dose.*—½ to 2 drachms of the diluted water. Distilled from the flowers of the bitter orange, *Citrus Aurantium*, var. *Bigaradia*. It is a saturated solution of the oil, and must be diluted immediately before use with twice its volume of distilled water.

Oleum Aurantii Dulcis expressed from the fresh peel of the fruit of the sweet orange, Citrus Aurantium. (*Oleum Aurantii Amaræ* is obtained from the peel of the fruit of the bitter orange.) Sp. Gr. at 15° C. 0·847—0·852 O.R. +96° to +98° at 20° C. (at Messina). **Terpeneless Oil of Orange** is prepared, being many times more potent in flavour and soluble in 60% spirit, *cf.* Vol. II. **Oleum Neroli.** The oil obtained in the distillation of above flowers is used in perfumery. Dilution with twice its volume of absolute alcohol preserves it. *For analytical data, vide Vol. II.*

Cortex Aurantii (*B.P.* '14 and **Indicus**).—Dried and fresh outer peel of the Bitter Orange (in India other varieties may be used if aromatic and bitter). **Tinctura Aurantii** (*B.P.* '14). 1 of fresh peel in 4 of Alcohol (90%). *Dose.*—½ to 1 drachm. Boa says that 90% Alcohol is too strong—it takes out the whole essential oil content, terpene, citral, etc. About 10% only of Essential Oil of Orange Peel is flavouring and is soluble in comparatively dilute alcohol, therefore make the Tincture using equal volumes of 90% alcohol and water. Some have suggested 70%. Mixtures containing Salts of Iron will become dark in colour with all preparations of orange peel. **Syrupus Aurantii** (*B.P.* '14). Tincture of Orange 1, Syrup 7. *Dose.*—½ to 1 drachm. **Vinum Aurantii. Orange Wine** (*B.P.* '14).—Made by 'fermentation of a Saccharine Solution to which fresh Bitter Orange Peel has been added.' It contains 12 to 14% by vol. of Ethyl Alcohol. In practice a boiling 25% Sugar Solution is poured on to the peel and allowed to stand for 24 hours. Yeast is added and the liquor fermented at 20° C. for 3 days. It may be necessary to fortify with spirit.

Avena Sativa.—Tincture of the oat, 1 in 5 made with 60% alcohol, in 20 minim doses relieved pruritic condition induced by eruption in dermatitis.

Azadirachta Indica. The bark was in I.C. Add. Generally called *Melia Azadirachta. Syn.* **Nim or Neem, Margosa,** is common throughout India—mostly planted. In malaria its efficacy is very doubtful.—I.D.C., 1916.

Margosic Acid.—From Oil of Margosa Seeds. The Sodium and Potassium Salts being soluble can be given *per os.* The Calcium and Zinc Salts for local use in skin affections.—Chatterjee & Ray, Ind. Jl. Med. Res. 1918, 5,656 abst., Y.B.P. 1919, 182. See also Ind. Jl. Med. Res., Oct., 1920.

In tropical granulomata Sodium and Potassium Margosates in 2 to 3 grain doses in 4% solutions intramuscularly have been tried, but caused irritation. Intravenously blocking of the veins occurred. Ethyl Margosate as a further step has been employed; it is non-irritant and has antiparasitic and bactericidal properties.—K. K. Chatterji, L. ii./25,1063.

Badiane. FR. CX. 1908 is Star Anise Fruit *q.v.* **Teinture de Badiane.** FR. CX. 1884. 1 in 5 by weight, Alcohol 80%.

Balsamum Gurjunæ.—Gurjun Balsam, Wood Oil. *Dose.*—½ to 2 drachms. From *Dipterocarpus turbinatus* and other species. Used in gonorrhœa and as an expectorant, given with malt extract. To test for *vide* Copaiba.

Balsamum Peruvianum (*B.P.* '14). *Dose.*—5 to 15 minims. From trunk of *Myroxylon Pereiræ*, U.S. *Toluifera Pereira* (*Leguminosæ*). A viscid liquid insoluble in water, soluble in chloroform, absolute alcohol and glacial

acetic acid; slightly in ether and petroleum benzine. Contains Cinnamein and Cinnamic Acid. Sp. Gr. between 1·14 and 1·158. "Synthetic" Balsam may be detected by shaking 2 Gm. with 10 Cc. of Petroleum Spirit. Evaporate the Petroleum Solution on a water bath, dry on same 10 minutes, cool, and add three drops Nitric Acid 1·38. Mix. Peru Balsam gives a golden yellow colour. Inhalation of a few drops of vapour 1 in alcohol 2 in a little hot water useful in pharyngitis. As a dressing to wounds, if aseptic, may be left for 20 days if necessary. Scabies has been treated with a paint of Balsam 3: Glycerin 1. But test for albumin in urine both before and during treatment. **Balsamum Lanolinatum.**—Lanolin 5,000, Vaselin 2,000, Balsam Peru 12: Otto 4.—Ph. Notes (Denmark). C.X. has **Unguentum Balsami Peruviani**: Peruvian Balsam 1, Lard 7. Wyatt Wingrave's formula: Balsam of Peru 20. Trikresol 5, Vaselin *q.s.* to 100. Mix warm. Ⓟ Lotio Balsami Peruviana.—MacNaughton Jones suggested in alopecia a preparation of Peru Balsam 1 drachm, Spirit of Rosemary 1 ounce, Tincture of Cantharides 4 drachms: Pilocarpine Nitrate 2 grains, Almond Oil 1 ounce. This is applied at night and washed off next morning with a borax and spirit lotion.

For scabies an ointment containing Peruvian Balsam and Sublimed Sulphur 4½% of each, in Soft Paraffin.—W. Knowsley Sibley (Treatment of Skin Diseases).

Menciere's Solution, *q.v.* contains Peruvian Balsam.

Balsamum Tolutanum (*B.P.* '14). *Dose.*—5 to 15 grains. Obtained from the trunk of the *Myroxylon Toluifera* (*N.O. Leguminosæ*). Recently prepared is soft, but becomes brittle in cold weather. Soluble 1 in 1 alcohol 90%. A standard of total aromatic acids is required. **Syrupus Tolutanus** (*B.P.* '14). *Dose.*—½ to 1 drachm. This is made by digesting the balsam and water on the water bath ½ hour. U.S. is Tincture of Tolu (1 in 5 of Alcohol 94·9% vol. 5 parts, Sugar 82, Magnesium Carbonate 1, Water to 100 *s.a.* **Tinctura** (*B.P.* '14) 1 in 10 alcohol 90%. *Dose.*—½ to 1 drachm. The balsam has the properties of the Cinnamic and Benzoic Acids it contains.

Baptisin. *Dose.*—1 to 5 grains. An extractive from Baptisia tinctoria, in small doses a laxative, in large doses a cathartic. Tincture 1 in 10 of Alcohol 60%. *Dose.*—5 to 30 minims. The Mother Tincture of Baptisia (Homœopathic) has a reputation for treatment of boils. Baptisol a phenol responsible for the blackening of the leaves on bruising or treating with chemical agents.—P.J. ii./15,761.

Ⓟ**Barii Chloridum.—Barium Chloratum, P.G. VI.** $BaCl_2 2H_2O$. *Dose.*—½ to 1½ grains. Max. single 3 grains or 9 grains per diem. Colourless crystalline plates, with bitter saline taste. *Soluble* 1 in 2½ of water. Solution is destructive to bacteria. *Incompatible* with sulphates, phosphates, tartrate and carbonates.

Mostly used for analytical purposes, but is of value as a heart tonic; has alterative properties; has been tried for syphilis and scrofula. Also 1% solution as eye wash in scrofulous inflammation. Varicose veins are treated by internal use, and applied locally over the distended vessels.—H. Barium Chloride, 0·03 Gm., three or four times daily by the mouth is sometimes of value in Stokes-Adams attacks.—L. i./27,401. In the form of **Barium Water** (*vide* Mineral Waters) it has also been used for glandular swellings. *Antidote.*—Sodium Sulphate.

Typhoid has been treated with **Barium Chloride** *per os* with good results in 33 out of 35 cases. *Dose.*—1 to 1½ grains, increased progressively to 7½ grains thrice daily for 6 to 7 days with intervals of 3 to 5 days.—per Pres. June, '29,224. No bad results except vomiting. 1·5 Gm. each day in divided doses for 5 days, with 5-day interval, then repeated for further 5 days.—E. Petrina, B.M.J.E. i./31,96.

Ⓟ**Barii Nitras** $Ba(NO_3)_2$=261·376 and Ⓟ**Barium Acetate** $(CH_3COO)_2Ba$=255·413 are employed in place of the chloride for testing.

Bassia Latifolia. MOWRA FLOWERS in India. A potable spirit can be prepared from them as they contain much fermentable sugar. The seeds yield *Mowrah Butter* melting at 24° to 25° C.; this fat is also suitable for candle and soap making (*cf. B Longifolia*), also as a food, but it soon becomes rancid in the hot climate.

Bassia Longifolia. N.O. *Sapotaceæ.* The seeds of this tree growing in Southern India and the Malay States are called Mowrah Seeds. *Syn.* **Illipi Nuts**; they yield 43 to 52% of yellowish solid fat, **Illipi Butter,** M.pt. 42° C. and solidifying at 36° C., containing about 80% of stearin and is suitable for

candle making. The residue contains a Glucoside 'Mowrin.' This yields 'Mowric Acid.' Both have a digitalis-like action, but they have an injurious effect.

Illipi Butter is similar to Cacao Butter. It may generally be distinguished by absence of the typical odour of the latter. Sp. Gr. 0·857. Viscosity at 60°, 103·7 (against Theobroma Oil 99·9). M.pt. 33° C. Iodine Value 31·5. M.pt. of fatty acids 52·8° C. Saponification Value 190.

It is much used as a Chocolate Fat. The cake is poisonous and can only be used as manure. In commerce, Illipi Fat is however now a generic name for numerous articles—hence the above data may vary.

Refs.—Lewkowitsch, Chem. Technology & Analysis of Oils, Fats and Waxes, 1922. Tate & Pooley, Analyst, June, '21,229. *Illipe* (*Borneo*) *Tallow.* Chemistry of.—C.D. i./30,751.

Beberinæ Sulphas. *Syn.*—Buxine and Pelosine. Probably a mixture of Sulphates of Berberine and Nectandrine. *Dose.*—1 to 10 grains; if in a mixture a little Aromatic Sulphuric Acid covers its bitterness. It is in scales, and is prepared from the bark of *Nectandra Rodiæi*, Bebeeru bark. It is also contained in Pareira Root. It is freely soluble in water. **Beberine Hydrochloride** is in reddish brown scales. Use, antipyretic and tonic as Quinine; useful for menorrhagia.

Belæ Fructus (BAEL FRUIT), *B.P.* '14.—*Ægle marmelos* (*Rutaceæ*). Fresh half ripe fruit. Mild astringent. The fresh fruit is useful in dysentery and in dyspepsia. **Extractum Liquidum** (*B.P.* '14). *Dose.*—1 to 2 drachms.

Syrup Ægle Marmelos Co. *Dose.*—Half to 1 ounce with water thrice daily. Is a proprietary in India, containing Bael Root, Cyperus Rotundus, Ginger and Plectranthus Zeylanicus. Stomachic in diarrhœa and dyspepsia.

Berberinæ Carbonas $C_{20}H_{17}NO_4$ $H_2CO_3+2H_2O=433·1874$ or $+5H_2O$. *Dose.*—2 to 5 grains.

Although contained in Hydrastis and Calumba, is obtained principally from the bark of *Berberis vulgaris* and other species of Barberry. In bitter yellowish crystals, insoluble in water. Its salts, the **Hydrochloride, Phosphate,** and **Sulphate,** are bright yellow in colour, and soluble in water, the hydrochloride about 1 in 400, the phosphate 1 in 12, and the sulphate 1 in 150. *Dose* of each.—2 to 6 grains. Given for indigestion, diarrhœa, malaria, and sickness in pregnancy. Injections of 0·25 Gm. Berberine Sulphate in 1 Cc. Distilled Water said to be effective in oriental sore. Inject into the sore, and repeat after a week.—R. L. Varma, I.M.G., '27,62,84. This is insoluble, but ¼ grain Berberine *Phosphate* in 1 Cc. has been used. ⅓ grain of the Sulphate in 1·5 Cc. Water. Hypertonic and Isotonic Saline strongly recommended in conjunction. Better than Tartar Emetic intravenously.—P. V. Karamchandani, L. i./30,78.

Successful treatment of oriental sore with 3 Cc. of 2% Berberine Acid Sulphate. Two to four injections effected a cure in 6 cases.—Pres., Oct., '31,355.

Berberine Sulphate in oriental sore was introduced by Capt. P. V. Karamchandani, I.M.G., 1927,566.—L. i./31,392.

Berberis Berries (Baies) are official in FR. CX. as ingredient in Electuaire diascordium.

Berberis aristata and other species. Histological study.—G. R. A. Short, B.P.C., 1926, C.D. ii./26,262.

Berberis (*B.P.* '14).—*B. aristata* (*Berberidaceæ*). Dried stem. Tonic. Extract is known as 'Rasot' in India. Used in intermittent fever.

Liquor Conc., I.C. Add., 1900.—*Dose.*—½ to 1 drachm. Alcohol 20%, 1 in 2.

Tinctura, *B.P.* '14. *Dose.*—½ to 1 drachm. Alcohol 60%, percolate 1 in 10.

Berberis Aristata and other species. Study of structure of the stems.—G. R. A. Short, P.J. ii./26,189.

Betel. *B.P.* '14.—*Piper betle.* (*Piperaceæ*). Dried leaves. The fresh leaves are contained in PAN (Beng.). Stimulant, narcotic, masticatory.—Externally in sore throats.

Bistorta Snakeweed, Adderwort. *Polygonum bistorta* L. P. Belg. IV.

Extractum Bistortæ, P. Belg. IV. A dry aqueous extract prepared from the root. Has astringent and mucilaginous properties. **Sirupus Bistortæ,** P. Belg. IV. a 5% solution of the extract in syrup. Used chiefly in hæmorrhages and mucous discharges, *per os* or by injection, or gargle.

Blepharis Capensis.—The Cape Gooseberry of South Africa. Tincture, 1 in 8 of 90% Alcohol. *Dose.*—15 minims (1 Cc.). Has been used in snake and insect bites and for toothache.

Blighia Sapida.—Vomiting sickness of Jamaica caused by poison produced by the immature fruit.—B.M.J. ii./17,109.

Boldoa fragrans (*Peumus Boldus*). *Dose.*—1 to 3 grains in cachet or capsule. The leaves, from Chili and Bolivia, resemble those of Sweet Gale (*Myrica Gale*), but are more aromatic. In dyspepsia, liver affections, rheumatism, and as a diuretic for atony of the bladder. **Tinctura Boldoæ,** 1 in 5 of 90% alcohol. *Dose.*—10 to 20 minims. The inhabitants in South America take half a litre of strong decoction a day for hepatic diseases.

Bonduc Nut.—The Seeds of *Cæsalpinia bonducella* are used in India as a tonic and febrifuge—generally mixed with black pepper for the purpose.

Brucea Sumatrana.—A plant indigenous to China and S. Asia. The seed known as El Kossam is said to be useful in dysentery, diarrhœa, and menorrhagia.—*Cf.* B.M.J. i./13,1403.

℗ **Brucine,** $C_{23}H_{26}N_2O_4+4H_2O=466{\cdot}2812$. *Dose.*—$\frac{1}{12}$ to $\frac{1}{2}$ grain. An alkaloid from *Strychnos Nux Vomica* seeds—small white acicular crystals with bitter taste. Very soluble in Alcohol and Chloroform. Its salts are soluble in water. Like Morphine it gives a red colour with nitric acid (*see* Water Analysis), which Strychnine should not. It is said to possess only $\frac{1}{15}$ of the physiological power of Strychnine. For epilepsy the ℗ Hydrochloride $C_{23}H_{26}N_2O_4.HCl=430{\cdot}6836$, has been given as liquor, same strength as Liquor Strychninæ, in 10 minim doses increased until ½ a grain is reached. ℗ **Brucine Sulphate** $(C_{23}H_{26}N_2O_4)_2.H_2SO_4=686{\cdot}5132+Aq$. White crystals soluble 1 in 80 in water.

Bryonia. *Syn.*—Vitis alba; White Bryony.

B. dioica is the only species commonly found in this country—hence called English Bryony. Contains an amorphous glucosidic bitter substance and an amorphous alkaloidal principle—intensely bitter. Chemical Notes and refs. 17th Edn., p. 785.

Tinctura Bryoniæ. B.P.C.—From bruised fresh roots of *Bryonia alba* or *B. dioica* (*Cucurbilaceæ*) a tincture is prepared corresponding in strength to 1 of dried root to 10 of alcohol (60%). *Dose.*—1 to 10 minims (0·06 to 0·6 Cc.) or more. Useful in pleurisy. Relieves the pain and allays the cough. In large doses it is an active cathartic, used for dropsy. It also checks metrorrhagia. The fresh plant applied to the skin will cause vesication.

Buchu (*B.P.* '14). The dried leaves of *Barosma betulina* (*Rutaceæ*) contain volatile oil and mucilage. Carminative and diuretic. Buchu has antiseptic action in irritability of bladder and for gonorrhœa. The **infusion** (1 in 20 boiling water) is representative of the activity of the drug. *Dose.*—1 to 2 ounces. *Flavoring.*—Syl Aurantii Floris, Syl Lavandulæ; Syrupus Aromaticus. **Tincture** (*B.P.* '14) 1 in alcohol 60% 5. *Dose.*—½ to 1 drachm. **Fluidextract** U.S. *Dose.*—30 minims. 1=1 hydro-alcoholic percolate. Buchu Cultivation and differentiation from other members of the *N.O. Rutaceæ* in South Africa. The dried leaves of *B. betulina* should yield 1·45% of oil.—P.J. ii./21,308.

Bulbocapnine, $C_{19}H_{19}O_4N$.

Dose.—0·1 Gm., either *per os* or subcutaneously once or twice daily.—Pres., Sept., '29,312,-314.

An alkaloid from *Corydalis tuberosa* D.C. (*Fumariaceæ*), known also as *C. cava*, *C. bulbosa*, and *Bulbocapnus cavus*—first isolated by Freund and Josephi in 1893. Insoluble in water but soluble in alkalis and precipitated from them by CO_2 or Ammonium Chloride. Solutions oxidise slowly to a green colour.

Of value, as a sedative, in tremor of various origins—paralysis agitans, choreic disorders, multiple sclerosis, and hemiplegia. In paralysis agitans it is better than Atropine, Morphine, Luminal, or Scopolamine.—Pres., Sept., '29,312.

In dose as above hypodermically or *per os*, of value in the treatment of the sequelæ to epidemic encephalitis in children.—L. i./29,968.

Menière's disease well treated. One tablet of 0·1 Gm. *per os* daily is sufficient to prevent vertigo, while the acute attack is treated by 0·1 Gm. hypodermically, which at once relieves.—W. S. Thacker Neville, B.M.J. ii./31,54.

Buteæ Semina (*B.P.* '14).—*B. frondosa.* (*Leguminosæ*). Dried kernels freed from testæ. Contains Moodooga Oil. Anthelmintic like Santonin.—P.J. 79, 446; E.P.I. i./550; Pg. I.i./454. Pulvis (*B.P.* '14).—*Dose.*—10 to 20 grains.

Caapi or '**Ayahasco,**' the root or rhizome of the woody vine *Banisteria caapi*, is used in Bolivia as a stimulating beverage. It gives courage and

fortitude in facing danger and suffering. Three alkaloids have been isolated, one being related to Morphine. This drug and *Miré* (a muscular paralysant of the Nightshade family) may have therapeutic applications.—L. ii./25,30.

Cajuputi Oleum. From leaves of *Melaleuca Leucadendron* and other species. Sp. Gr. 0·919 to 0·930. Further chemical notes: 17th Edn., p. 785.

Gastric flatulence is at once relieved by Spirit of Cajuput 8 minims, Sal Volatile 25 minims, Spirit of Chloroform 15 minims, Spirit of Peppermint 12 minims—taken in a wineglass of water.—A. P. Luff, B.M.J. i./14,635.

Leucadol.—A redistilled oil of Cajuput boiling below 235° C., fractionated from the high-boiling constituents. A yellow liquid, Sp. Gr. 0·922, and Cineol content 78%. Has been employed in chest affections by injecting into the bronchi. It is miscible with 40% Iodinol in all proportions, with which it has been used for diagnosis. Mix with Olive Oil up to 5% for Oleothorax, or weaker for intratracheal injection.

Calendula Officinalis (*Compositæ*). Dried florets. *Dose.*—15 grains. Tincture 1 in 5 Alcohol 96%. *Dose.*—5 to 20 minims. Applied to wounds, and is given in amenorrhœa. It has diuretic and stimulant properties.

Calumba (*B.P.* '14). Dried root, sliced, of *Jateorhiza Calumba* (*Menispermaceæ*).

Non-astringent tonic for simple debility and indigestion. Can be given with Salts of Iron. Infusion 1 in 20 (cold water); Tincture 1 in 10 Alcohol 60% (U.S.X. 1 in 5). *Flavoring.*—Glyl Aurantii Amari (double dose), Glyl Lavandulæ, Syrupus Aurantii Amaræ. Was represented in I.C. Add. by *Coscinium fenestratum* (false Calumba Root). Calumba is sometimes termed 'Radix Fraseri.'

Cambogia, U.S., P. Austr. *Dose.*—½ to 2 grains. Fr. Cx. Gomme Gutte. Yellow Gum Resin from *Garcinia Hanburii* (*Guttiferæ*) growing in Siam. A powerful purgative. May cause severe griping. Will expel tapeworm. Is rarely now given alone.

Canella Alba. Wild Cinnamon (*Magnoliaceæ*) contains Aromatic Oil. Stomachic.

Cannabis Sativa (*Urticaceæ*), Russian hemp-seed, oil-free (extracted by Benzine) has been used in form of decoction, strength 100 Gm. in 1 litre, heated gently and evaporated (without boiling) to 250 Cc. 35 to 50 Cc. of the resulting liquor are given to children in the food. The dried hemp seed freed from oil contains 1·5% Phosphorus in organic combination as against 1% before the fat is removed. Children are said to greatly improve under the treatment.

Emulsio Seminum Cannabis.—10% in water. Used as a potion against gonorrhœa, two glasses daily. Has slight sedative properties.—(Russia) Ph. Notes.

Capillus Veneris, Maidenhair. *Syn.* Capillaire, P. Belg. IV. *Adiantum capillus veneris* L. (Filicinées). A *Fluid Extract*, 1 = 1, is prepared from the leaves with boiling water with 25% Spirit and 5% Orange Flower Water added, also *Capilli Veneris Sirupus*, consisting of 25 of the Fluid Extract with 975 parts of syrup. A popular cough medicine on the Continent. An infusion of 1 ounce to a pint of boiling water is taken in wineglassful doses.

Carbo Animalis. Animal Charcoal. *B.P.* '85. **Carbo Animalis Purificatus** *B.P.* '85 was treated with hydrochloric acid. **Carbo Ligni** (*B.P.* '14), U.S. **Wood Charcoal.** *Dose.*—60 to 120 grains. Made by burning wood, *e.g.*, willow, to red heat with access of as little air as possible. In cachets or as charcoal biscuits as an absorbent in distension of the stomach, *e.g.*, in dyspepsia. Is antiseptic, and is used externally as a poultice to foul ulcers. Cocoa Nut Charcoal was employed by Dewar owing to its remarkable powers of absorbing gases to improve high vacua.

Charcoal as an absorbent might be useful in cholera, typhoid, gastro-enteritis.—P.J. ii./12,98. As antidote. *See* Poisons and Antidotes.

A test for activity of medicinal and other Charcoals by exposure to water and other vapours. Active Charcoal will absorb 50 to 100%, or even more, of moisture. The water figure is slightly higher than that for Alcohol or Turpentine. *Pulv. Carbo. Lig.* as ordinarily dispensed for medicinal purposes *is inactive.* The author suggests improvements in the manufacture and the adoption in the *B.P.* of tests for activity.—H. Brindle, P.J. ii./28,84; C.D. ii./28,116.

✱**Norit** (T.M. 359695, 484598). *Syn.* **Activated Charcoal.** *Dose.*—5 Gm. in water three or four times daily. A variety of vegetable charcoal with high

adsorbing qualities, containing 85% ashless vegetable charcoal and less than 5% mineral matter. *Uses.* Similar to ordinary charcoal in gastric and intestinal affections. Locally useful for suppurating wounds and ulcers.

Norit Tablets, 5 grains each. Useful protective against infection *via* the tonsils and air passages. It adheres to the mucous membrane.

By the use of Norit the strength of such solutions as 1% Mercuric Chloride and 1% Morphine Hydrochloride could be greatly reduced.—L. i./23,342.

Experiments *in vitro* on absorption of poisons showed that the new plant Charcoal, 'Supra-Norit,' was in all cases more active than 'carbo animalis' (Merck).—J.C.S., A. i./25,736.

Activated Charcoal adsorbs or inactivates Strychnine, Brucine, Adrenalin, Histamine and Tyramine. With Ephedrine and Acetyl-choline adsorption or destruction is not quite complete.—F. Saunders and co-workers, Jl. Pharm. and Exp. Therap., June, '31,177.

Carbonis Bisulphidum. CS_2=76·12. A clear liquid with characteristic odour Sp. Gr. 1·268 to 1·269. Very slightly soluble in water, but readily in Alcohol, Ether and Chloroform and the fixed and volatile oils. Dissolves Phosphorus Sulphur and Rubber with avidity. Is poisonous, but has been employed in treatment of phthisis.

Acute poisoning by, respirations very slow (about 12 per minute). Expiration deep, prolonged and blowing; heart not much affected, but pulse weak.

In tuberculosis, inhaled, useful, has no disagreeable after effects. Is parasiticide. In fibrinous pneumonia small doses with water have been used.

Carbon Bisulphide Regulations. S.R. & O., 1927, No. 198, amended by S.R. & O., 1927, No. 865.—C.D. ii./27,420.

Odourless Carbon Disulphide. Carbon Disulphide is shaken with Mercury separated, and allowed to stand for a short time in the presence of 2% of pure fat. On distillation, practically odourless Carbon Disulphide is obtained. —P.J. i./25,518.

Cardamomi Semina. Dried ripe seeds of *Elettaria Cardamomum* (*Scitaminaceæ*). The seeds should be removed from their pericarps when required for use. Given in atonic dyspepsia. Contained in **Pulvis Aromaticus. Tinctura Cardamomi Composita** (*B.P.* '14). *Dose.*—½ to 1 drachm. Cardamom Seeds 1·4% with flavourings. Raisins now omitted and 45% Alcohol *vice* 60%. Tincture, U.S., 1 in 5 Alcohol (48·9% vol.). **Compound Tincture,** U.S. X., Cardamon 20, Cinnamon 25, Caraway 12, Cochineal 5, Glycerin 50, Alcohol (48·9% vol.) to 1,000. Compound Cardamom Tincture is incompatible with Alkaloidal salts, Bismuth Oxide, Oxycarbonate and Subnitrate: employ Liquor Bismuthi in preference. It is also incompatible with metals of the alkaline earths and with Sodium Bromide.—P.J. i./06,218.

Colour of Compound Tincture of Cardamoms depends on change of *p*H. buffer salt added—to give a constant *p*H of 7—stabilises. There should be no contact with Iron or Copper in percolation. 60% Alcohol should replace 45%.—R. R. Bennett and G. Middleton, P.J. ii./26,173.

Carminum.—Red colouring matter, containing about 50% Carminic Acid, $C_{17}H_{18}O_{10}$=382·1404, prepared from the cochineal insect—*Coccus Cacti* (*Hemiptera*), the dried fecundated female insect reared on *Nopalea Coccinellifera* and other species of *Nopalea*. The sun-dried insects, if killed by sulphur or charcoal fumes, are silvery colour and designated 'silver grain,' owing to deposit of wax on the surface. If killed by hot water and dried artificially the 'black grains' are produced. It is insoluble in water, but entirely soluble in aqueous ammonia. Is used to colour toilet preparations and for staining in microscopy.

Nature and Structure of Cochineal. An exhaustive paper.—Am. Jl. Ph., Aug., 1913.

Carminic Acid is a hydroxyanthrapurpurin.—J.C.S.A. i./20,442.

Carmalum.—Carminic Acid 1, Ammonia Alum 10, Distilled Water 200 Heat to dissolve. Cool and filter. Suitable for staining after osmic acid, *cf.* Mayer's Carmalum. **Liquor Carmini.** Carmin 1, Distilled Water *q.s.* to moisten, Strong Solution of Ammonia 1, dissolve, and add Water 10. Used to colour toilet preparations, etc. **Tinctura Cocci** (*B.P.* '14). 1 in 10 Alcohol (45%). *Dose.*—5 to 15 minims.

Liquor Cocci, Liquid Cochineal.—Cochineal (not bruised), Potassium Carbonate, of each 1, Distilled Water 8. Heat in water-bath for half an hour, gradually add Acid Potassium Tartrate 1, stir well, continue the heat, and add Potash Alum (in powder) 1; heat five minutes more, strain through

absorbent wool and pour over contents of strainer sufficient Distilled Water to make strained product measure 8; when cold add Chloroform ½% by volume. As indicator in titrations the tincture may be used. Suitable for titrating alkaloids with mineral acids, the alkaloids giving the same colour as mineral alkali. Ipecacuanha Alkaloids give trouble however.

Carui Oleum. *Syn.* OLEUM CARI, U.S.—Caraway Oil. *Dose.*—½ to 3 minims. Distilled from fruits of Carum Carvi (*Umbelliferæ*) (content up to 7%), and rectified. Colourless or yellowish oil. Sp. Gr. 0·910 to 0·920. Soluble in equal vol. of 90% Alcohol.—*B.P.* '14.

Carvonum, P. Austr. *Syn.* Carvol. $C_{10}H_{14}O$ = 150·1092. A yellowish or colourless liquid prepared from the oil has Sp. Gr. 0·960—0·964. Soluble 1 in 2 diluted alcohol. See also Allen, 1911, Vol. IV, p. 214.

Caryophylli Oleum.—Clove Oil. *Dose.*—½ to 3 minims. Colourless to brownish oil. Distilled from the flower buds of *Eugenia Caryophyllata* (*Myrtaceæ*). Sp. Gr. 1·047 to 1·065. *B.P.* '14. Soluble 1 in 3 of 70% Alcohol. Should contain at least 85% Eugenol *B.P.* '14 (80% P. Ital. V.). Aromatic carminative. Given with advantage both internally 3 to 5 minims, and injected hypodermically in phthisis 5 minims in olive oil. A satisfactory disinfectant for the hands (said to be even more efficient than Mercuric Chloride), catheters, catgut, etc.

Castor Oil as an adulterant to the extent of 10% has been found in Clove Oil. The Oil was dextrorotatory. Treated with steam the residue was easily detected. Sap. V, 179, soluble in 90% Alcohol, insoluble in Petroleum Ether.

Clove Oil from Islands of Pemba and Zanzibar—6% obtainable from the roots and 20% from the buds. The former contains higher percentage of Eugenol.—C.D., 1923,98,136.

Tinctura Caryophylli 1 in 8 Alcohol 90%. Digest 10 days. *Dose.*—20 to 40 minims or more; valuable aromatic, carminative and stimulant.

In senile flatulence good effects by powdered cloves, better even than a fluid preparation. Spirit of cloves is absorbed in the stomach, but the woody fibre passes on to the seat of the complaint. 5-grain Stearettes are prepared.

Catha Edulis. *Syn.* Kat or Khat. *Dose.*—1 drachm to ½ ounce (4 to 15 Gm.) infused in about 6 to 8 ounces of hot water as required. A sprig of about 10 leaves weighing about 10 grains is chewed at a time by natives. The shrub grows wild in Abyssinia and along the East Coast of Africa. It is cultivated for native use in Arabia. The taste is slightly astringent, and at the same time sweet and resembling licorice.

Three alkaloids were isolated by Stockman—*Cathine* (very soluble in water) *Cathinine* (less soluble) and *Cathidine* (insoluble).

In man they all act chiefly on the cerebrum and spinal cord, causing stimulation or much excitement according to dose, and Cathine alone induces slight drowsiness at first.

The herb is a stimulant narcotic. It has been known for generations for its sustaining power. The activity of the leaves when used in an infusion in the same manner as tea or coffee, or when chewed (as by the Arabs), is stated to cause 'staying power,' wakefulness and refreshment. Further details in our Edn. XVII, p. 272, and XVIII, p. 291. It is thought to have power in strengthening the action of the bowels. **Extractum Cathæ.** *Dose.*—2½ to 10 grains (0·18 to 0·6 Gm.). A solid extract made with 60% Alcohol, 1 = 4 of leaves for use in pill or Tablets (2½ grains each. *Dose.*—1 to 4).

Extractum Cathæ Liquidum. *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.). Strength 2 = 1, prepared with Alcohol 60%. This preparation should be recently made. **Effervescent Catha and Phenolphthalein.**—*Martindale. Dose.*—1 to 2 teaspoonfuls in ½ tumbler of warm water a good ½ hour before breakfast. A tonic laxative combining the effects of the active principles of Catha with the mild purgative properties of Phenolphthalein. **Catha, Milk and Glycerophosphate.**—*Martindale. Dose.*—A tablespoonful in a small cupful (4 to 5 ounces) of hot water. Similar to Milk and Glycerophosphate with addition of Catha. Forms an agreeable beverage. **Catha Cocoa Milk.** *Dose.*—1 tablespoonful, mixed with a small cupful of hot, nearly boiling, water, twice or thrice daily or as required.

Cascarilla (*B.P.* '14). Dried bark of *Croton Eluteria* (*Euphorbiaceæ*). Contains resin and 0·5 to 3% Volatile Oil, also the bitter principle cascarillin (best extracted by Acetone), together with resin and tannin. Aromatic tonic. **Infusum Cascarillæ,** 1 in boiling distilled water, 20. Infuse 15 minutes. **Tincture,** 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm.

Cassiæ Pulpa (*B.P.* '14). *Dose.*—1 drachm to 2 ounces, from pods of *Cassia Fistula* Linné (*Leguminosæ*). Dried cylindrical brown fruit 20 mm. in diam. and 25 to 50 cm. long. Fr. Casse en batues. Mild aperient.

Castor, P. Austr. and Helv. Dried preputial follicles and secretions from the Beaver, *Castor Fiber* (*Rodentia*), in brown pieces. To contain not more than 40% insoluble in hot alcohol. Stimulant and antispasmodic. Is given in dysmenorrhœa as Tincture 1 in 20. *Dose.*—½ to 1 drachm, suspended in water, with Mucilage of Acacia. *See* also Mistura Morphinæ et Phenazoni Composita.

Fr. Cx. describes the two commercial varieties Canadian and Russian.

Guttæ Castorei Compositæ containing Tincture of Castor 1 ounce, Compound Chloroform Tincture 4 drachms, Compound Tincture of Lavender 1 ounce, Spirit of Camphor 4 drachms, Spirit of Nitrous Ether 1 ounce. A teaspoonful in water for nervousness or sleeplessness.

Catechu (*B.P.* '14). *Syn.* Catechu Pallidum. Dried extract of leaves and young shoots of *Uncaria Gambier* (*Rubiaceæ*). Gambir, U.S., is the dried extract from *Ourouparia Gambier* (*Rubiaceæ*). Soluble in water to the extent of about 50% (U.S. 70%). Astringent in diarrhœa. *Dose.*—5 to 15 grains. Tincture 1 in 5, Alcohol 45% with Cinnamon 1 in 20. (Tinctura Gambir Composita, U.S.—*Average dose,* 1 drachm; 1 in 20 Diluted Alcohol with Cinnamon 1 in 40). **Trochiscus Catechu** contains 1 grain. For relaxed throat.

Catechu Nigrum. From Acacia Catechu. May be used in other parts of the Empire. '**Cutch**' is obtained from the heartwood of this tree.

Caulophyllin. *Dose.*—1 to 4 grains. Resinoid from root of *Caulophyllum thalictroides*—blue cohosh, pappoose, or squaw root. Contains an alkaloid which is chemically Methylcytisine, $C_{12}H_{16}ON_2$, M.pt. 137° C. (Cytisine occurs in Laburnum seeds and in the common gorse.) It also contains two glucosides, which are saponins.—F. B. Power and A. H. Salway, C.D. i./13,202. Has diuretic, diaphoretic, anthelmintic properties, emmenagogue, and antispasmodic. It appears to exert a direct influence on the uterus, Liquid Extract made with Alcohol 70% N.F. 1=1. *Dose.*—8 minims. Examination of the fruit of.—P.J. ii./08,550.

Liquor Caulophylli et Pulsatillæ. B.P.C. *Dose.*—1 to 2 drachms Liquid Extract of Caulophyllum 25, Liquid Extract of Pulsatilla (1=1 with 60% Alcohol) 5, Glycerin 15, Alcohol 60% to 100.—P.J. ii./10,393.

A sedative in dysmenorrhœa and uterine disorders.

***Pulsa** (T.M. 481,423). *Dose.*—2 drachms diluted with 1 ounce of water thrice daily. When the period begins, increase to every two hours. A preparation containing Caulophyllum and Pulsatilla with carminatives, for the treatment of dysmenorrhœa. If taken for a few occasions, may effect a complete cure.

Cedri Ligni Oleum chiefly from *Juniperus Virginiana* (*Coniferæ*; family *Cupressineæ*) yields a stearoptene Cedrene Camphor (Cedrol) [$C_{15}H_{26}O$] and an oleoptene Cedrene $C_{15}H_{24}$, the odour of which is distinct and stronger than the Camphor, and taste finally peppery. Oil largely used in perfumery, also in a thickened form by concentration *in vacuo*, in microscopical work with oil immersion lenses. **Paraffinum Liquidum** is also used for this.

It is also the product of distillation of chip shavings and sawdust of pencil cedar (*J. americana* and *J. bermudiana*). It resinifies rapidly and is suggested as an addition to Paraffin for burns.—M. Hartog, L. i./17,475.

Cedrus Atlantica. The essential oil distilled from the wood. *Syn.* **Libanol** Sp. Gr. 0·9517. $[\alpha]_D = +488$ at 20° C. Soluble 1 in 3 to 4 of Alcohol 90%. Capsules contain 8 minims. *Dose.*—Up to 6 per diem *p.c.* Said to be useful in phthisis, bronchitis and skin affections. Ointment 25% with Vaselin basis.—N.S.D.

Distillation of Cedar sawdust in Morocco showed a content of 5% of oil, Sp. Gr. 0·9533, soluble 1 in Alcohol 90%.—Massy, P. R., 1922,59. The wood yields 7% of tar.—Y.B.P., 1922, 59.

Cera Alba is Yellow Wax (*Cera Flava*) bleached from the honeycomb of *Apis Mellifica* (*Hymenoptera*), M.pt. about 61—64° C. To detect paraffin char with Sulphuric Acid, which oxidises the wax—leaving the paraffin unchanged—this may then be extracted with ether. Paraffin lowers the M.pt. Wax made from *flaxes* similar to beeswax.—W. Honneyman, P.J. ii./26,157.

Cera Aseptica. Horsley's Wax. An aseptic wax for surgeons' use.—Yellow Wax 7, Carbolic Acid 1, Olive Oil 2. It is employed warm at a temperature such that its consistence is just sufficiently soft for easy manipulation. It

is heated at temperature of boiling water 5 minutes and then poured into Saline or Mercuric Chloride solution at 105° F. from which it is used during the operation.—P. Sargent, B.M.J. ii./22,1200.

As a plugging for the exposed cancellous bone in drainage for empyema in tuberculous children—free drainage effected.—Denis Browne, L. ii./30,736.

Oxycroceum Plaster. P. Helv. Yellow Wax 35, Colophony 25, Elemi 10, Galbanum 5, Myrrh 5, Resin 12, Crocus 1, Extract Rhatany 2. Modified formulæ are given in P. Edin. and P. Lond.

Cereus (Cactus) Grandiflorus (*Night-blooming Cereus*). *Syn.* **Cirio de Flores Mayores.** Ph. Mex. V. Liquid Extract (imported), 1=1. *Dose.*—1 to 10 minims. Tincture, fresh flowers and young stems 1, alcohol 4. *Dose.*—2 to 10, increased to 30 minims. Has been used as a cardiac tonic, free from cumulative or narcotic action, but evidence of utility is doubtful. A proprietary 'Cactina Pellets' was in demand.

Cactus grandiflorus. Two similar species used, accounting for divergent views.—H. H. Rusby, P.J. ii./29,313.

Cerii Oxalas. P. Jap., $Ce_2(C_2O_4)_3$, $9H_2O$=706·4004. *Syn.* CER OXYDULOXALAT. *Dose.*—3 grains. A white insoluble crystalline powder. Incinerated it loses 53% of its weight. *Uses.*—In vomiting, particularly that of pregnancy, also in chronic diarrhœa, hysteria, epilepsy and migraine.

Cerii Sulphocarbolas. *Syn.* CERII PHENOL-SULPHONAS. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.) $Ce_2[C_6H_4(OH)SO_3]_6$=1318·854 (+Aq.).

A well-defined crystalline salt resembling the corresponding thorium body in appearance, suggested for therapeutic use by G. T. Morgan.

Introcid and Dextrocid. Iodine and Cerium compounds in treatment or malignant tumours.—Spencer Mort, L. i./30,105.

Cetaceum, Spermaceti. *Syn.* **Blanc de Baleine** FR. CX. White unctuous crystalline substance (M.pt. 46—50° C.), obtained from *Physeter Macrocephalus* and other species of whale, *e.g.*, *Hyperoodion rostratus.*—P.J. ii./13,68. The spermaceti from the latter is somewhat harder and quite equal in quality. Consists chiefly of Cetyl Palmitate, $C_{15}H_{31}CO.OC_{16}H_{33}$=480·512. Soluble in chloroform 1 in 1¼ and in Ether about 1 in 7, also in hot alcohol. Is contained in Cold Cream *q.v.* Unguentum Cetacei (*B.P.* '14). Now contains Liquid Paraffin in place of Benzoin and Almond Oil. A good addition to theobroma suppositories for hot climates.

Cetraria Islandica (*Discomycetes* or *Discolichenes*), **Iceland Moss** was at one time a 'throat remedy,' in form of decoction, jelly, or lozenge. Chemical data 18th Edn., p. 821. **Lichenoids** composed of it lubricate and soothe the mucous membrane of the throat. To be slowly dissolved in the mouth, suitable in inflammatory and excitable states of fauces and oropharynx, especially to speakers who suffer with dry mouth and throat. As a sialogogue they are excellent correctives in pyrosis.

Chaparro Amargosa. Bitter Bush. *Syn.* **Castela Nicholsoni**—a wild plant of South Texas and Mexico. Decoction a heaped teaspoon of twigs and leaves or root bark or decorticated root in 20 ozs. of water, boiled for 15 to 30 minutes. Enema also used as above. The drink as above taken thrice daily. *E. Histolytica* carriers treated. For this and other Mexican herbs, see E. M. Holmes, C. & D., Jany. 8, 1921, p. 40. Contains Glucoside Castelin. Compares very favourably with Emetine in treatment of amœbic dysentery.—A. W. Sellards and L. Leiva, per Jl. Trop. Med., May 1/23,145; B.M.J.E. i./23,57.

Cheiranthus Cheiri (*Cruciferæ*, Wallflower).—This plant is stated to contain a Digitalis-like glucoside of such power that 0·0005 Gm. will produce systolic cardiac arrest in the frog—also an alkaloid cheirinin which acts on nerve centres and on muscles.—U.S.D.

Chekan.—The leaves of *Myrtus Chekan* are aromatic and expectorant used in chronic coughs and bronchitis. *Dose*, of fluid extract, ½ to 3 drachms.

Chelidonium Majus.—GREATER CELANDINE.—The yellow milky juice is an old remedy for warts and opacities of the cornea. The freshly expressed juice preserved by ½% by volume of chloroform has been much used as a remedy for cancer, given internally in dose of 10 to 60 minims, and in some cases with striking results. A fluid extract (*Dose.*—10 to 30 minims) from the dried plant has been used for injection into diseased tissue, and, diluted, as a lotion. An alkaloid, Chelidonine $C_{20}H_{19}NO_5,H_2O$=371·1718, has been isolated, melting at 135° C. The Hydrochloride and a Sulphate have been sued as morphine substitutes in cancer. *Dose.*—3 grains twice a day.

Chenopodium Anthelminticum. *Linne* (*Chenopodiaceæ*). Contains a Volatile Oil, Official in U.S. X. *Average Dose* (U.S.).—15 minims (Ph. Ned. V. has max. *pro die* 22 minims). For round worms 10 minims on sugar or in emulsion; has given good results in ascarides, 0·25 to 0·5 gram in sugar and water, and following this in an hour or two with a dose of castor oil. The treatment may be repeated after a day's interval. The sole constituent of the oil active against hookworms, is *ascaridole* (60 to 70%), which is unstable.—T. A. Henry, C.D., Oct., 1921, p. 555; P.J. i./23,29; P.J. ii./21,349. Liquid Extract 1=1. *Dose.*—½ to 1 drachm.

Experiments showed that 1 in 10,000 of the Oil kills living ascarides, while Eucalyptol does not kill in several days in 1 in 2,000 Solution.—H. Brüning.

Chenopodium paralyses but does not kill round and hook-worms, which must be expelled by free purgation.—Dixon, p. 421.

A method for the determination of Ascaridol in Chenopodium Oil. The U.S.P. method is shown to be unreliable.—H. Paget, Analyst, '26,170.

Ankylostomiasis.—The oil is best taken in conjunction with Thymol at suitable intervals. *Dose.*—16 minims in two capsules followed by 2 ounces of Castor Oil in 4 hours. Thymol in doses of 5 grains.—Report on public health of Jamaica, C.D. January 13/17.

Uncinariasis Commission of the Orient. The Oil in small doses is more efficient than similar dose of Thymol.—L. i./21,235.

The maximum individual dose for hookworm appears to be 1 Cc., but three capsules, each containing 0·5 Cc., may be given at two-hourly intervals, followed three hours later by 1 ounce of Magnesium Sulphate.—L. i./22,1057.

Oil is preferable to Thymol, though the after-effects—giddiness, deafness, burning in stomach and headache—are more pronounced.—Rockefeller Foundation Report.—T.D.B. 18/21,117.

Signs of collapse after Chenopodium treated with 1½ Cc. Pituitrin intramuscularly.—D. C. Richards, per Jl. Trop. Med., Feb. 15/23,69.

Dangers of Chenopodium Oil. Many cases of poisoning recorded—some fatal. No other drug should be given with the anthelmintic.—B.M.J.E. i./24,57.

20,000 worm cases treated by a fresh mixture of 1 part with 7 of Carbon Tetrachloride.—Jl. Trop. Med., Feb. 1/24,31.

The secret of its correct use is to prevent absorption. Give in *one* sufficiently large dose and expel from the intestines by aperients.—B.M.J.E. ii./24, 86.

Fatality after taking 10 Gm. within a week.—per Jl. A.M.A. i./26,1175.

Cases showing heavy ovum count were given full hospital diet, an Iron and Arsenic tonic thrice daily, and Chenopodium Oil 20 minims on one day a week for three doses.—D. D. McCarthy, Jl. Roy. Soc. Trop. Med., Jan. 30, '30,402.

Children of about 12 years of age may receive 20 minims, washed out with salts 3 hours afterwards. Brings away *A. lumbricoides.* One dose not always sufficient. A child of 3 received 2 minims, finally working up to 10 minims.—T. W. S. Paterson, 24/7/28.

See also Carbon Tetrachloride, Thymol, and Therapeutic Index.

Chicle, the basis of **American chewing gum, is** stated to be the juice of *Achras sapota*, a tree found in Southern Mexico, British Honduras and in Central and Northern South America. It is obtained, like rubber latex, by tapping, and the milky fluid is boiled until it coagulates and is then pressed.—C. & D. i./25,802. Personally, we have been informed that one of the Spurges is largely collected in Australasia for the purpose of making chewing gum.

Chirata.—*Swertia Chirata* (*Gentianaceæ*). Entire plant. Bitter tonic given in indigestion for anorexia and torpid liver with constipation. *Dose* of powder 20 grains. Fluidextract, U.S. VIII. *Average dose.*—15 minims. Tincture (*B.P.* '14) 1 in 10 Alcohol 60%. *Dose.*—½ to 1 drachm. Might be made with Alcohol 45%.—P.J. ii./09,142. Infusion 1 in 20. *Dose.*—½ to 1 ounce.

Japanese Chiretta. Swertia Chenensis is more bitter than the official.—V. Cofman B.P. Conf. 1919.

Chlorophyll.—The green colouring matter of plants extracted first by ether, then alcohol—in which latter the chlorophyll is soluble, leaving the waxy matter behind, or it can be produced by Acetone extraction. Supplied commercially in solid extract and liquid form. Oil soluble and water soluble varieties are available. Further information on Chlorophyll, see ✱' **Phyllosan** (T.M. 409946), Vol. II.

Chondrus Crispus (*Gigartinaceæ*), Irish Moss. **Carrageen, Ph. Ned. V., P. Belg. IV.** Employed as decoction, Moss ½ ounce, Water 1½ pints boiled down to 1 pint. Flavoured with a little sugar and lemon juice. Demulcent

and nutritive. Contains about 60% Carbohydrate, 7% Protein, and 10% more or less of ash.

Cicuta Virosa (*Umbelliferæ*), Water Hemlock, Cowbane, or Wild Parsley contains Cicutoxin, a substance giving rise to convulsions by action on the spinal medulla. Poisonous to some animals, though eaten by sheep without killing them. Cases of poisoning.—G. A. Stutterheim, Y.B.P. 1919, 179.

Cimicifugæ Rhizoma (*B.P.* 1898), U.S. *Dose.*—15 grains. The rhizome and rootlets of *Cimicifuga racemosa*, *Actæa racemosa* (Linn.), black snakeroot or black cohosh. Indigenous to the United States and Canada. Contains the resinoid Cimicifugin, also a small quantity of Isoferulic (hesperetic) Acid and a trace of an alkaloidal body. *Dose.*—1 to 6 grains in pill. Useful in chronic rheumatism, lumbago, sciatica, chorea, and amenorrhœa: also as a tonic and antispasmodic and to excite contraction of the uterus (?) **Liquid Extract** (*B.P.* 1898). 1=1 of Cimicifuga exhausted with 90% alcohol. *Dose.*—5 to 30 minims. **Fluidextract U.S.X.** 1=1. *Average dose.*—15 minims. **Tincture** (*B.P.* 1898). *Syn.* TINCTURA ACTÆÆ. 1 in 10 of 60% alcohol. *Dose.*—30 to 60 minims or 5 minims every hour. *Flavoring*, Syl Vanillæ, Syl Rosæ; Syrupus Aromaticus.

In rheumatoid arthritis, 15 minims of tincture with 5 minims of tincture of gelsemium thrice a day.

Snake Root, in India, is termed *bo boni*, has the appearance of dried ginger, and is white in section. It is eaten in pieces size of a pea after poisoning. The snake charmers use it to stupefy snakes. (This Indian snake root has evidently no connection with Cimicifuga.) 'Snake stone' is said to be obtained from a frog,—it is also used in India after poisoning.—It is stated to "cure."—For details see L. i./11,892,1535.

In chorea Liquid Extract of Cimicifuga from fresh herb in ½ to 3 m. doses for a child of 12 years. Liquid Extract of Gelsemium, 1/3 to 1 minim may be given in conjunction, as also Liquid Extract of Scutellaria laterifolia—a reliable sedative. 2 minims for a dose for a child. Should insomnia be present give Hyoscyamus (not mixed with the above)—3 to 4 minims of Tincture in water every half hour, beginning late afternoon until sleep occurs. —Pres., July, 1913,244.

✱**Otosclerol** (T.M. 502351).

Dose.—1 tablet thrice daily after meals, increased if necessary. A preparation containing Cimicifugin, Bromides, and combined Phosphorus. For deafness.

Cnicus Benedictus. *Syn.* **Carduus Benedictus,** Chardon Benit, The Blessed Thistle, P. Belg. IV. *Cnicus benedictus* L. (Composées).

The flowering plant is used. It is odourless and has a bitter taste. A tonic, diaphoretic and emmenagogue. Useful in dyspepsia, intermittent fevers, and loss of appetite, and in warm infusion—1 ounce to pint of boiling water—to break up colds.

Cocillana (*Guarea Rusbyi*). The bark of a South American plant, stated to equal ipecacuanha in expectorant properties and to be, in addition, tonic and laxative. Ⓟ Syrup of Cocillana Compound a specialty. Each drachm containing Tincture of Cocillana 5 minims. Tincture of Euphorbia Pilulifera 15 minims, Syrup of Wild Lettuce 15 minims, Fluid-Extract of Squill ¼ minim, Fluid-Extract Senega ¼ minim, Tartrated Antimony $\frac{1}{184}$ grain, Cascarin 1 grain, Heroin Hydrochloride $\frac{1}{24}$ grain, Menthol $\frac{1}{100}$ grain. *Dose.*—½ to 1 drachm.

Cochlearia Armoracia, fresh Horseradish Root. Sialogogue, stomachic. and slightly diaphoretic. Yields pungent volatile oil on moistening or rasping. Used as **Spiritus Armoraciæ Compositus** (*B.P.* '14).

Collinsonia Canadensis.—The root of this, commonly known as stone-root or knob-root, Heal-all, Hardhack, in America, has been employed in gravel and other urinary affections. Is an antispasmodic in flatulent, infantile, and biliary colic, and locally in lax conditions of the uvula, pharynx, and vocal cords. Tincture, 1 in 10 of alcohol 60%. *Dose.*=½ to 2 drachms. Liquid Extract, 1 in 1. *Dose.*—15 to 30 minims. Suppositories containing 20 to 30 grains of the powder are also used. Has also been employed in cancer of stomach and cystitis. The early colonists in America probably used the fresh root for 'the liver.' The tincture is said to be really useful—something of the Podophyllum effect without griping. Under the name **Helalin,** Liquid Extracts are prepared containing, in addition, Cascara and Pepsin as hepatic stimulants. *Dose* of each 1 drachm.

Condurango Cortex, P.G. VI., P. Ital. V., P. Belg. IV.—*Dose*, in powder, 15 to 60 grains (1 to 4 Gm.). The stem bark probably of *Marsdenia cundurango, Reichenbach fil.* from Peru. Is bitter and acrid. Alterative, a supposed specific for cancer, syphilis, and dyspepsia, and with hydrochloric acid in enuresis, is a stomachic and stimulant. **Extractum Liquidum** B.P.C., 1901. 1=1 of Bark in 60 powder exhausted with 60% alcohol. *Dose.*—10 to 60 minims. Alcohol 45% is a good menstruum.—P.J. i./01,747. **Infusum, 1** in 20 of hot water. *Dose.*—½ to 2 ounces (15 to 60 Cc.). **Vinum, P.G. VI.** Liquid Extract of Condurango 10, (1=1 made with alcohol 1 and water 3), Aromatic Tincture 1, Sugar 9, Sherry 80. (**Aromatic Tincture** P.G. VI. **is** Cinnamon 5, Ginger 2, Galangal (*Alpinia Officinarum*) 1, Cloves 1, Cardamoms 1, Dilute Spirit 50). *Dose.*—½ to 1 ounce (15 to 30 Cc.). **Tincture** 1 in 10 Alcohol 60%.

Convallaria Majalis (*Liliaceæ*). LILY OF THE VALLEY.—(Entire plant.) Two glucosides have been obtained from the plant: **Convallarin,** a purgative. (*Dose.*—3 to 4 grains); and **Convallamarin** (*Dose.*—½ to 2 grains). A cardiac stimulant and diuretic used in preventing arrest of circulation in chloroform narcosis.

Its action is so feeble as to be almost of no value in medicine. **Tincture,** B.P.C. *Dose.*—5 to 20 minims, 1 of flowers in 8 of Alcohol 60%. The drug is an old remedy for dropsy. **Extract** (Aqueous). *Dose.*—2 to 8 grains, in pill. **Fluid-Extract.** *Dose.*—8 minims. 1=1 of dried rhizome and roots. The flowers are stated to be more active than the root.

Coriandri Fructus. *Dose.*—20 to 60 grains. Dried ripe fruit, *Coriandrum sativum* (*Umbelliferæ*). Aromatic and carminative. **Oleum Coriandri.** *Dose.*—½ to 3 minims, Sp. Gr. 0·87 to 0·885. Is contained in preparations of rhubarb and senna to prevent griping.

Aqua Carminativa P. Austr.—Peppermint Leaves, Roman Chamomile Flowers, Fennel Fruit, Coriander Fruit, Caraway, Orange Peel, of each 15. Distil to produce 1,000. A pleasantly flavoured aromatic water.

Coronilla varia.—An aqueous extract of the leaves and flowering tops is used in cardiac affections; does not derange digestive functions. *Dose of* Extract is 1½ grains (0·1 Gm.) three or four times daily. Tincture 1 in 8, by percolation. *Dose.*—30 to 60 minims.

Costus *Syn.* **Kunth, Kuth** or **Koot** Root, *Saussurea Lappa N. O. Compositæ.* The root of this plant (about 5 ft. high), of which the Kashmir Government have the monopoly, contains a small amount of Essential Oil (we obtained 0·015%). In powder it is used for preserving furs, etc., from moth. The oil is used as a basis for perfumes: the powder for sachets.

A Liquid Extract 1=1 made by percolation with 90% Alcohol to exhaustion and concentrating. Used for the treatment of asthma: ½ to 2 drachms stated to stop paroxysms. It may be taken as such in a little water (to cut short a paroxysm), or in the form of a mixture, taken 3 to 4 times daily, containing—Potassium Iodide or Potassium Bromide 5 to 10 gr., Tinct. Belladonna 3 to 5 m., Borax 2 gr., Liquid Extract of *S. lappa* ½ to 2 dr., Spt. Chlorof. 10 m., Water 1 oz., for continued administration. Has no cumulative action. Is not claimed to produce a permanent cure.—R. N. Chopra, I.M.G., Apl., '28,189. Ind. Jl. Med. Res., '29,351.

Cratægus Oxycantha (*N.O. Rosaceæ*), *Syn.* ENGLISH HAWTHORN, HAW. *Dose.*—2 to 15 grains thrice daily. Liquid Extract of the fruit, 10 to 15 minims.

Contains a cyanogenetic glucoside. A cardiac tonic, in dyspnœa, hypertrophy, valvular insufficiency and heart oppression.

Crocus, Saffron (*B.P.*, 1898). The dried stigmas and tops of the styles of *Crocus sativus* (*Iridaceæ*) Linn. Every filament should give a blue colour on placing in Sulphuric Acid. It is a curious old delusion that saffron tends to bring out the rash of measles.

Cubeba (*B.P.* '14). *Dose.*—30 to 60 grains in cachets. The dried unripe full-grown fruit of *Piper Cubeba* (*Piperaceæ*). The genuine—imported from Java—give a crimson colour with sulphuric acid, and are free from mace-like taste and odour. **Cubeb Cigarettes** are useful for catarrh and excessive bronchial secretion. It is sometimes added to Ferrier's Snuff, *q.v.* **Oleum Cubebæ, U.S. IX.** *Dose.*—5 to 20 minims. Colourless, pale green or greenish yellow oil, with camphoraceous odour and characteristic taste. Soluble 1 in 20 in alcohol 90%. At least 60% should distil between 250° and 280° C. **Capsules** contain 10 minims. For combinations *v.* Oleum Santali. Used in

bladder and urethral affections. **Suppositoria** 10 grains each for astringent effect. **Tinctura Cubebæ**, 1 in 5 Alcohol (90%) (*B.P.* '14). *Dose.*—½ to 1 drachm. In chronic bronchitis as an expectorant. *Flavoring.*—Syl Aurantii Amari, Glyl Pini. **Oleo-resina Cubebæ** (*B.P.* 1885). *Dose.*—5 to 30 minims. **Trochisci Cubebæ**, T. H., marked 'C.B.' ½ grain each (U.S. IX. ⅓ grain) with fruit paste. *Dose.*—1 every 3 or 4 hours. **Vapor Cubebæ cum Limone**, T.H. Cubeb Oil ½ drachm, Oil of Lemon 10 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce. Has stimulating effect in chronic bronchitis.

Cucumis (*Sativus*).—**Cucumber.**—The juice of the fruit is in French Codex to prepare **Unguentum Cucumeris**—*Syn.*—Fr. POMMADE AUX CONCOMBRES: Cucumber Juice 1,200, Lard 1,000, Veal Suet 600, Balsam of Tolu in Alcohol 90%. *q.s.*, 2, Rose Water 10. A cooling ointment, used like cold cream.

Cucurbitæ Semina Præparatæ. MELON PUMPKIN SEEDS (*B.P.* '14). *Dose.*—3 to 4 oz. bruised with water or milk. Fresh ripe seeds of *C. maxima* (*Cucurbitaceæ*), deprived of testa and tegmen. Anthelmintic.—Give first a saline purge and afterwards Castor Oil.

℗ **Cucara.** *Syn.* CURARE, OURARI, URARI, WOURARA, WOURALI. *Dose.*—$\frac{1}{20}$ to ½ grain. The South American Indian arrow-poison, produced from species of *Strychnos* and other plants (*Loganiaceæ*). A blackish-brown dry extract, with bitter taste; contains some resin, but is nearly all soluble in water.

Two varieties of Curare are said to be made, one from the fresh bark of the branches of *S. Gubleri*, strong (for larger animals) and the other (weak, for small birds, etc.), from *S. toxifera*.

Curare is an extract of different plants of which the active principle is derived from the bark of various kinds of a Liana-like South American *Strychnos*. Commercial "Calabash" Curare is derived from *S. Toxifera*: "Pot" Curare from *S. Castelnaei* together with *Cocculus Toxiferus* (*Menispermaceæ*), while "Tube" Curare is from unknown plants.—B.M.J. ii./11,218.

Use of Wourali as arrow poison in South America.—Sir J. Bland-Sutton, B.M.J. ii./22,932.

Antidotes.—(There is no tetanus—poisoning is not like that of Strychnine.) Artificial Respiration, Stimulants—brandy, hot gin, sal volatile freely. Ligature if wound; this may be cautiously loosened and tightened again to admit a little of the poison at a time to the system. Wash the wound.—Murrell.

This and Curarine have been given hypodermically in hydrophobia and for strychnine poisoning.

Tetanus treated by Curare after antitoxin had failed. Subcutaneous injections of two, increased daily to five mgr. An attempt to raise the dose to six mgr. led to transient paralysis of the respiratory muscles, causing dyspnœa. The dose of 5 mgr. was continued. The convulsions which sometimes occurred every hour subsided. Patient received 63 mgr. in 14 days.—B.M.J.E. i./21,93.

℗ **Hypodermic Injection.** 10%. *Dose.*—1 to 6 minims. Use sterile distilled water, *q.s.*, to form a thin paste, transfer to a funnel plugged with absorbent wool, and gradually add water *q.s.* ℗ **Hypodermic Tablets** contain $\frac{1}{12}$ grain of Curare.

Mason and Wheeldon murder conspiracy against Mr. Lloyd George and Mr. A. Henderson, March, 1917. See Edn. XVIII., p. 825. It was stated that no fatal case has been recorded in literature of curare poisoning.

℗ **Curarina.** $C_{19}H_{26}N_2O = 298{\cdot}2188$. Another formula:—$C_{18}H_{35}N$. *Dose.*—$\frac{1}{100}$ to $\frac{1}{40}$ grain (?). This, the active principle of Curare, is a powerful poison, in yellowish powder soluble in water and alcohol.

Cuspariæ Cortex.—The dried bark of *C. Febrifuga. Syn.* Angostura Bark. Stimulant and tonic. In diarrhœa, dysentery and dyspepsia much employed in South America and West Indies. *Dose* of powdered bark, 10 to 30 grains. The Bark is stated to contain Cusparine $C_{20}H_{19}NO_2$, Cusparcine $C_{18}H_{19}NO_2$, and Galipoidine $C_{18}H_{15}NO_2$.

Cydoniæ Vulgaris Semina (Quince Seeds). Contain a gum—Cydonin—about 20%. One part of the seeds, with 40 of water, yields a thick jelly used as mucilaginous agent in toilet preparations. **Mucilage** of quince is official in some Pharmacopœias, the strength varying from 1 in 25 in the Austr., to 1 in 100 in the Belg. The strength of 1 in 50 of cold water or rose-water is the one generally preferred. Macerate with the cold water for from ½ to 2 hours, and strain without expression. **Decoction** of quince is made by boiling for ten minutes. Preservative is necessary. Such 'Creams' are

Medicated with Witch Hazel, Borax, or Tincture of Benzoin. Irish Moss Decoction, 1 in 30 is similarly employed.

Cynoglossum Officinalis, *Hound's tongue* (*Boraginaceæ*). Has demulcent properties. May act similarly to Curare.

Cypress Oil. The oil of various species has been substituted intentionally or carelessly, *e.g.*, *C. Lusitanica* gives a larger percentage of oil and is cheaper —E. M. Holmes, P.J. i./23,107. It is employed to give persistence in perfumery.—W. A. Poucher, *ibid.* 181.

℞ **Cytisine,** $C_{11}H_{14}N_2O = 190{\cdot}1092$. *Syn.* Ulexine. Is an alkaloid obtained from *Cytisus Laburnum*. It is also present in *Ulex europæus*—the common furze. ℞ Cytisine Hydrobromide, a freely soluble salt, *dose*, $\frac{1}{20}$ to $\frac{1}{5}$ grain, has diuretic properties. It benumbs the tongue. The Glucoside contained in small dose produces hyper-excitability. Mild doses feeble cardiac tonic—diuretic. Poisoning by Laburnum Seeds. Expectant treatment and recovery.—B.M.J. ii./17,676.

Damiana. *Syn.* "BOHADSCHIA" (APHRODISIACA), HYSTERIONICA, BAYLAHUEN. The leaves of *Turnera diffusa var. aphrodisiaca* and other species (*Turneraceæ*) possess aphrodisiac properties. Useful in melancholia. Said to be tonic and diuretic. Contains bitter substances, resins, and volatile oil.

Liquid Extract of Damiana, 1=1, made with alcohol 60%. *Dose.*—½ to 1 drachm. *Flavoring.*—Glyl Pini, Syl Rosæ, Syl Lavandulæ. **Extract** *Dose.*—2 to 10 grains. Ⓟ **Mistura Damianæ Composita.** *Dose.*—1 to 2 drachms. Sodium Hypophosphite 5 grains, Calcium Hypophosphite 5 grains, Liquid Extract of Damiana ½ drachm, Liquid Extract of Nux Vomica 2 minims, Chloroform Water to 2 drachms. Ⓟ **Pilula Damianæ Composita.** Extract of Damiana 2, Phosphorus $\frac{1}{100}$, Extract of Nux Vomica ⅛. Liquorice Powder *q.s.* to 3½ grains. *Dose.*—One, two, or three times a day.

Dammar as used in this country for varnish making and for microscopic work is the East Indian Dammar from *D. Orientalis.*—It occurs in small yellow resinous pieces somewhat larger than wheat. It is partially soluble in alcohol and soluble in chloroform.

Dioscorea villosa. *Syn.* Wild Yam, Colic Root, Rheumatism Root. (Aletris Farinosa Rhizome *q.v.*, is also called Colic Root.)

Liquid Extract. *Dose.*—½ to 1 drachm. Used in colic, spasms, stomach and intestinal irritation. Has antibilious and diaphoretic properties.

Divi-Divi. A dye extracted from the seed pod of a small tree growing wild in the peninsula of Goajira (Venezuela).

Dragon's Blood. Resin from *Dæmonorops Draco* is the chief ingredient in mahogany varnishes. Distinguishes Benzine from Benzol, *cf.* Benzol.

Drosera rotundifolia.—The leaves of Sundew (FR. CX. entire plant), yield a greenish-brown, odorous, very acrid resin, Glucose, Citric Acid, and probably Malic Acid, and a ferment which converts Albumen into Peptone. Have been recommended for chronic bronchitis, asthma and to ease the cough of phthisis. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 10 minims. FR. CX. 1 in 5 alcohol 60%. In pertussis, small doses of the 1 in 10 Tincture.

Whooping cough, paroxysmal stage. Drosera *not* found specific. In doses beyond *min. iii ter in die* of the 10% tincture it is irritant.—B.M.J. ii./25,1222.

Echium Vulgare (*Boraginaceæ*) **Vipers' bugloss** has some relationship to Curare in action, causes same symptoms as alkanet *q.v.* with more hyperæsthesia and greater weakness of the muscles.

Elaterium (*B.P.* 1898). *Dose.*—$\frac{1}{10}$ to ½ grain. The dried sediment from the juice of fruit of *Ecballium Elaterium* (*Cucurbitaceæ*). A powerful hydragogue cathartic, useful in renal or cardiac disease complicated with dropsy. In Cyprus we understand the peasants take the fresh juice of the fruits by the nostrils for jaundice.—Ph. Notes. **Pilula Elaterii Composita,** St. Bart.'s H. Elaterium ¼ grain, Compound Extract of Colocynth 2 grains, Calomel 1½ grains, Capsicum ½ grain. **Tinctura Elaterii Composita.** *Dose.*—10 to 30 minims. Elaterium in powder 1, Chloroform 50, macerate 2 days, then add Alcohol (90%) 200, and Compound Tincture of Cardamoms 250, macerate 5 days more and filter. Is more active than a corresponding dose of the powder.

Elaterinum. (*B.P.* '98, U.S.). *Syn.* MOMORDICIN. $C_{20}H_{28}O_5 = 348{\cdot}2184$. *Dose.*—$\frac{1}{40}$ to $\frac{1}{10}$ grain. The crystalline neutral active principle (to extent of at least 20%) of Elaterium, insoluble in water, soluble in chloroform (about 1 in 12) and sparingly in alcohol. For the Chemistry of Elaterin, see Edn. XV., p. 815. **Pulvis Elaterini Compositus** (*B.P.*, 1898). Elaterin 1, Milk Sugar 39. *Dose.*—1 to 4 grains.

Embelia (*B.P.* '14). *Dose.*—1 to 4 drachms. Dried fruit of *E. ribes* and *E. robusta* (*Myrsinaceæ*). Anthelmintic, especially for tapeworm.

Emblicæ Fructus. Black or Chebulic Myrobalans. Terminalia Chebula (*Combretaceæ*), is *B.P.* '14. The dose of the powder ranges from a few grains to 2 dr. Dried mesocarp of the fruit is employed—astringent in action. It is a valuable styptic. Purgative in large doses (½ to 2 dr.), but may constipate after purging. Reduces albumin and blood in the urine, and is said to have similar action on glucose. The natives employ it in perineal injuries caused during child-birth, eczematous sores and prolapsus ani—as gargle and dentrifice in spongy gums, and as injection in diarrhœa, internally stomachic and cholagogue. **Unguentum,** *B.P.* '14 (and ℙ CUM OPIO, *B.P.* '14), are equivalent to gall ointment (and with Opium).

The fruits of the various species of *Terminalia* (five principal varieties) are largely used in tanning. The kernels contain 36% to 37% of a non-drying oil.

Equisetum Arvense P. Austr. 'Cat's Tail.' The sterile shoots contain Equisetic Acid, said to be identical with Aconitic Acid.

Erigeron Canadense—Fleabane. The oil distilled from the herb. *Dose.*—5 to 30 minims. Sp. Gr. 0·850 to 0·890. Capsules contain 5 minims, and a Liquid Extract of the leaves is prepared. *Dose.*—30 to 60 minims. Oil has been thought to have astringent and hæmostatic properties, especially in uterine, urinary and nephritic affections, dysuria, strangury. The fresh herb may yield 0·5% of oil, which on keeping will deposit resin and crystals. The only known constituents are Limonene and Terpineol.—Finnemore.

Erodium Cicutarium. Storks-bill (Geraniaceæ). **Liquid Extract.** *Dose,* 15 minims three or four times daily, 1=1, has been used instead of Hydrastis. Macerate 100 of the powdered herb in 60 of a mixture of Alcohol 90% and water *p. eq.* for 24 hours. Then percolate until 80 of percolate are secured. Reserve this and percolate to exhaustion. Evaporate this to 20 and add to the reserve.—P. Van der Wielen.

Eryngium Maritimum. The Sea Holly. Decoction of fresh leaves, 1 in 10, preserved with 20% Alcohol. *Dose.*—A wineglassful three times a day. For kidney or bladder trouble. The root of *E. campestre* is used similarly.

Erysimum. *Syn.* **Sysimbrium Officinale.** FR. CX. *Syn.* Herbe aux Chantres. An old remedy for hoarseness. **Sirop d'Erysimum** a proprietary. *Dose.*—½ ounce thrice daily, in a teacup of infusion of the same plant, is given in catarrhal laryngitis.

Erythrophlœum. Casca Bark.—*Syn.* SASSY BARK; ORDEAL BARK. The bark of *Erythrophlœum Guineense* (*Leguminosæ*).

Tinctura Erythrophlœi. 1 in 10 Alcohol (90%.) *Dose.*—5 to 10 minims. Contains the alkaloid Erythrophleine in small amount.—C. W. Maplethorpe, P.J. ii./23,85. ℙ **Erythrophlœinæ Sulphas.** *Dose.*—$\frac{1}{40}$ to $\frac{1}{24}$ grain in pill. Yellowish granular crystals, very soluble in water. Has the combined action of Digitalin and Picrotoxin, and is a local anæsthetic for eye-work in 0·05 to 0·25% solution.

Antidote.—A prompt emetic or use of stomach pump, with subsequent stimulants. Has been used for the treatment of sensibility of dentine. The sensibility in a cavity filled with the alkaloid was in 24 hours absolutely abolished.

℗ **'Throphleol,'** is a solution (50%) of **Erythrophleine Sulphate in Eugenol.**

Esparto Grass from Spain and N. Africa is a source of wood pulp in paper making. It is boiled with Caustic Soda to dissolve away the fleshy parts, the fibrovascular tissue of the nature of wood being left. It is then bleached. The trade in the grass amounts to 200,000 tons per annum. A by-product of great value in the grass amounting to 3½% is a wax and oil mixture.—C. F. Cross, C.D. i./17,252.

Eucalypti Gummi (*B.P.* '98). *Syn.* **Kino Eucalypti** (*B.P.* '14). RED GUM. *Dose.*—5 to 20 grains in powder.

An exudation from *E. rostrata* (*Myrtaceæ*), and other species. 80 to 90% of it is soluble in cold water, almost entirely soluble in Alcohol (90%). Used in diarrhœa, and relaxed throats, and as astringent generally.

To be distinguished from the common Australian or Botany Bay kino, said to be from *E. resinifera* (*Myrtaceæ*). The latter is very resinous and little soluble in water; was included as **Kino Eucalypti in I.C. Add.**

Decoction. *Dose.*—2 to 4 drachms, 1 in 40. Boil and strain. Used as gargle and for diarrhœa. **Liquid Extract, B.P.C.** *Dose.*—30 to 60 minims

in water. Eucalyptus Gum 25, Distilled Water 65. Dissolve by constan shaking, strain and add Alcohol 90% 10 and water *q.s.* to 100. A styptic **Insufflation** 50% in starch. A powerful astringent in hæmorrhage and re laxed conditions of the larynx and trachea. **Suppository,** 5 grains in eac with cacao butter (pressed dry). **Syrup.** Liquid Extract of Eucalyptus Gum 5, Sugar 3. *Dose.*—30 to 60 minims. **Tincture.** 1 in Alcohol (90%) 4 b maceration. *Dose.*—20 to 40 minims. 1 to 7 of water as a gargle.

External hæmorrhage of any form could probably be stopped by local us of this tincture combined with internal use of Calcium Chloride. It is usefu in dental work, and to cuts caused by accidental injury. **Trochisci Kin Eucalypti** (*B.P.* '14). Contain 1 grain in each.

Trochisci Eucalypti Compositi.

Potassium Chlorate 2 grains, Cubeb Powder ¼ grain, Eucalyptus Gu grain with fruit paste, and are marked C.E. Useful in congested and relaxe throats, especially when mucous secretion is arrested.

Eugenol, U.S.—Eugenic Acid, $C_6H_3(OH).(OCH_3).C_3H_5$, 4 : 3 : 1 = 164·0936 A colourless oily liquid (B.pt 251° to 253° C.), darkening on exposure. I is the chief constituent found in oil of cloves. It has a strong clove odour and is a powerful antiseptic and antiputrescent. Is employed by dentists Causes reduced sensibility of mucous membrane, but not complete anæsthesia Useful with wool fat in eczema.

Eupatorium. *Average dose.*—30 grains. Dried leaves and flowering tops c *Eupatorium perfoliatum* (*Compositæ*) Linné. Thoroughwort or Indian Sage Tonic and diaphoretic; in large doses, emetic and aperient. Employed i dyspepsia, and the infusion (1 in 20. *Dose.*—1 to 4 ounces or more) has bee given in tapeworm. **Liquid Extract,** 1 = 1. *Dose.*—30 minims.

Euphorbia Peplus (*Euphorbiaceæ*). PETTY SPURGE, DEVIL'S MILK.

In cases of dyspnœa whether of pulmonary or pneumo-gastric origin. Mod fies secretion in asthma and suppresses attacks. The fresh plant has a acrid juice, which, when dried, imparts its virtues both to water and alcoho **Decoction.** 45 grains to the pint. *Dose.*—1 teacupful (diluted if preferred) or 4 times daily, preferably between meals. Flavoured, *e.g.*, with Glyl Lavan dulæ or Syl Rosæ. **Extract.** *Dose.*—7½ to 30 grains. **Tincture.** (1 in by 45% Alcohol.) *Dose.*—30 to 60 minims during the day.

Euphorbia Pilulifera. (*Euphorbiaceæ.*) Australian Snake Weed or Cat Hair. For asthma, bronchial affections, paroxysmal dyspnœa, laryngea spasm, whooping-cough, angina pectoris, in coryza, and hay fever. Contain Gallic Acid, Quercetin and a Phenolic substance $C_{28}H_{18}O_{15}$; also a glucosid and a minute amount of alkaloid. **Extract** (Aqueous). *Dose.*—½ to 1½ grains **Tincture.** *Dose.*—10 to 30 minims. 1 in 5 of alcohol 60%.

E. Pilulifera was first introduced by Carr-Boyd of Townsville, Queenslanc in 1880 as an asthma remedy and became known as the 'Queensland Asthm Herb.' The plant that has passed under the name *Euphorbia Pilulifer* Linn, is really *E. hirta*, Linn. This alteration is awkward, but the difficult can be lessened by using the name *Euphorbia Pilulifera Jacquin* as a synonym —E. M. Holmes, P.J. i./23,162.

Fevillea cordifolia. N.O. *Cucurbitaceæ.* The Segra Plant (Snake Vine The seeds, termed locally "Antidote Cocoon," are used as an antidote agains snake and other poisons in Jamaica.

Ficus Carica.—The acrid sap of the common fig produces dermatitis o the skin. In Southern Europe the Sap is in use as a counter-irritant or ves cant. Occasionally it gives rise to ulceration.

Fœniculi Fructus. Fennel. Dried ripe fruit of *Fœniculum vulgare N.O Umbelliferæ* (cultivated) (*B.P.* '14), contains Volatile oil. Congealing poin not below +3° C.—U.S. *Dose.*—5 to 15 minims. Sp. Gr. 0·960 to 0·990 Soluble in an equal vol. of 90% alcohol. Constituent anethol, aromatic.

Given to infants in form of **Aqua Fœniculi.**

Fœnugreek. *Trigonellæ Fœnu-græci Semina* (*Leguminosæ*). The herb largely grown in India and Egypt. Contains a large proportion of mucilage an about 5% oil. Chief use, veterinary. An Egyptian preparation. *Helba*, made from Fœnugreek Seeds—when soaked they swell into a pasty conditio like a pudding—in Cairo this is hawked in the streets, and the cry of 'Helba is a familiar one. It prevents fever, and is valuable in many ways, *e.g.*, i stomach complaints in the Cairo district. The seeds may be ground to powde and swallowed in about 1 or 2 teaspoonful doses. Or the seeds infused i water for a few hours and the supernatant liquor employed. Or a handfu

of the seeds is soaked in a basin of water for from 12 to 24 hours, then removed and placed in an unglazed flower-pot (which has been previously kept under water ½ hour) and allowed to sprout during 3 or 4 days. When the plant has grown to about 2 inches it is ready for use. It is eaten raw along with the seeds. This sprouted remedy is best and most employed. It has been tried in diabetes.—Geo. H. Stephenson, Cairo.

Directions for use in diabetes. One eggcupful of the seeds is added to 1 pint of cold water and simmered down slowly to a gill (5 ounces). Strain and drink the liquid cold on an empty stomach each morning before breakfast.—A. Charlton, 8/7,1931.

Numerous patients affirm its value. The treatment can be spread over a long period and is combined with strict diabetic control and white meat.

Fragaria Vesca. STRAWBERRY. Sprue treated with Ethereal Strawberry Extract. Zilva showed that it was possible to extract by alcohol the fat-soluble factor from vegetables and that this extract also contained the anti-neurotic and to small extent the antiscorbutic factor. An Ether extract of the Alcohol extract contained a substance which promoted the recovery and renewed growth in rats declining on account of fat-soluble factor. Clinically, in typical sprue cases, with usual diet, has been found beneficial.—A. Castellani and K. C. Browning, B.M.J. i./22,718.

Frangula. *Rhamnus Frangula* Bark (*Rhamnaceæ*), Buckthorn Black Elder or Alder Buckthorn, Fr. Bourdaine. It grows all over Europe and in America. Should be one year old. Contains Emodin, etc.—Y.B.P., '23,223. Cathartic especially for hæmorrhoids and chronic constipation. Liquid Extract *B.P.* '85 1=1. *Dose.*—1 to 4 drachms. Common Buckthorn in this country is *R. catharticus.*

Syrupus Rhamni, B.P.C. *Dose.*—½ to 1 drachm. Is prepared from Common Buckthorn Berries. Evaporate fresh buckthorn berry juice 50 to 30 and set aside 12 hours, filter and dissolve sugar 65 in the filtrate with heat, strain and cool. Mix Strong Tincture of Ginger 0·52 with Alcohol 3·12, add to the Syrup and finally water to 100 by weight.

Laxative action of *Alder BuckthornBark* due to a stable amorphous glucoside, Glucofrangulin, a new kind of anthraglucoside.—P.J. ii./25,37 ; ii./26,738.

✱**Normacol** (T.M. 467415).

Dose.—1 to 2 drachms in a glass of water once or twice daily.

A preparation of dried plant mucus of the Bassorin type containing a little Buckthorn Extract (Fr. *Bourdaine*). It is also made without Rhamnus Extract (' *sans Bourdaine* '). For treatment of habitual constipation.

Bassorin is the name given to the insoluble portion of many gums—Acacia, Tragacanth, etc. It swells up with water, but is not soluble.

Fucus Vesiculosus (*Fucaceæ*). **Bladder** or **Sea Wrack.** Preparations of this, being rich in Halogen Salts have had reputation for reducing corpulence. Contains Mannite. Fucus may contain as much as 0·21% of Iodine. **Liquid Extract,** B.P.C. 1=1 of Bladder Wrack in 45% Alcohol. *Dose.*—1 or 2 drachms before meals. It is recorded a lady lost 20 lb. in 9 weeks when taking the liquid extract, without bad results.

In thyroid gland disease bladder-wrack was found to increase the thyroid secretion markedly.

Chronic subcutaneous fibrosis treated by Fucus combined with a more or less strict diabetic diet, exercise and massage.

✱**Integar Capsules** (T.M. 421774). *Dose.*—1 or 2 at bedtime. A preparation of Fucus Vesiculosus, Ox Bile and Pancreatin. Laxative, cholagogue and intestinal antiseptic useful in intestinal catarrh and colitis.

Galangal (*Zingiberaceæ*). Indian Root, China Root in 2 varieties : ' large ' from *Alpinia galanga*, Willd., and ' small ' *A. officinarum. Dose.*—15 to 30 grains. Aromatic tonic. Contained in ' Hippocras,' *q.v.*

Galbanum (*B.P.* 1898). *Dose.*—5 to 15 grains. Gum resin from *Ferula Galbaniflua* (*Umbelliferæ*) and other species. Expectorant and stimulant.

Galega officinalis, or goat's rue, an effective galactagogue when given to nursing women. An extract is prepared. *Dose.*—5 to 10 grains.

Tephrosia virginiana is also known as goat's rue, but is not the drug intended for use.

Galium Aparine.—The plant Cleavers or Goose Grass. Is acid, astringent, and diuretic. Has been used in dropsy, jaundice, scrofulous scaly eruptions, epilepsy and obesity. **Succus Galii.** *Dose.*—1 to 2 drachms ; and **Extractum Galii,** 5 to 20 grains. For psoriasis.

Galla. *Dose.*—7½ grains. Excrescences on *Quercus infectoria* (*Cupuliferæ*), caused by deposition of eggs of *Cynips Gallæ Tinctoriæ* (*Hymenoptera*). Astringent. Contain Tannic and Gallic Acids. **Unguentum Gallæ** (*B.P.* '14), 1 to 4 of Benzoated Lard.

Gentianæ Radix.—Dried rhizome and roots of *Gentiana Lutea* (*Gentianaceæ*). A bitter tonic. Yields 30 to 40% of Aqueous Extractive. This is largely used as a pill excipient. Gentian (P. Jap.) is 'Ryutan.' Prof. Greenish on Powdered Gentian.—P.J. i./12,201. Gentiopicrin $C_{16}H_{20}O_6$—an 'anthermic' glucoside is contained to extent of 1·5%. Has properties allied to quinine. *Dose.*—20 to 30 grains in malaria.—Y.B.P., 1913,127.

Notes on Gentian.—H. Stanley Redgrove, P.J. i./29,374.

Pastilli Stomachici, P. Jap. IV, Sodium Bicarbonate 0·25 Gm., Ryutan 0·1 Gm.

Infusum Gentianæ Compositum (*B.P.* '14). *Dose.*—½ to 1 ounce. An infusion of Gentian Root, Orange Peel and Fresh Lemon Peel. (Dry may be used in the Tropics.) **Infusum Gentianæ Aromaticum** (was Brompton H.), Gentian Root 2 ounces, Lemon Peel 6 drachms, Orange Peel 3 drachms, Boiling Water 1 gallon. **Tinctura Amara.** P.G. VI. Gentian Root 3, Centaury Root 3, Orange Peel 2, Orange Berries 1, Zedoary Root 1, Diluted Alcohol (67 to 69% volume) to 50. **Mistura Gentianæ Alkalina.** Brompton H. Sodium Bicarbonate 15 grains, Gentian Infusion to 1 ounce. (℗ Previously contained Hydrocyanic Acid, 3 minims.) **Elixir Gentianæ Acidum.** *Martindale. Dose.*—1 to 2 drachms in a little water. Concentrated Compound Infusion of Gentian 20 minims, Taraxacum Juice 10 minims, Dilute Phosphoric Acid 2½ minims, Sherry 20 minims, Glycerin 7½ minims. **Infusum Gentianæ Compositum Concentratum.** *Dose.*—30 to 60 minims. Gentian and Orange Peel in No. 10 pdr. each 2, Lemon Tincture 2, Orange Tincture 1, Alcohol 90% 3·5, Diluted Chloroform Water to 20 by process (*a*) for infusions (*q.v.*) 1 part diluted to 8, resembles *B.P.* '14 Infusion.

✱**Gencydo.** (T.M. 424634). A preparation for hay fever made from plants containing lime salts and vegetable acids. (The lime treatment of hay fever is thought by some to be important.) *Ampoules* stated to contain Gentiopicrin 0·01 Gm., and Extractum Cydoniæ Seminum 0·01 Gm. for injection. A liquid containing the same ingredients is used as a paint for the nose, as also an ointment.

Geranium Maculatum (*Geraniaceæ*).—Cranesbill root. *Dose.*—15 grains to 1 drachm is a powerful astringent; contains about 16% of tannin; used in diarrhœa, and locally in relaxed conditions of the mucous membranes. Geranin, a dried extract, is given in dose of 1 to 5 grains. Liquid extract, 1=1. *Average dose.*—15 minims.

Germanium Dioxide. An American method of treatment of pernicious anæmia, less toxic than arsenic. Causes in animals a distinct rise in the number of blood cells, but in practice the results were negative.—M. G. Alexander, B.M.J. ii./22,979.

It is stated to have *no* hæmatopoietic effect and is toxic.—Per Pres., Jan., '26,2.

Ginseng. *Dose.*—15 grains to 1 drachm. The name applied in China to roots of probably several plants to which are attributed miraculous properties.

The active principle of Ginseng is a glucoside.

The Chinese actually count five kinds of Ginseng. According to them the true Ginseng, 'Panax' Ginseng, acts on the spleen, which is to them the centre of life: Adenophora acting on the lungs: Scrophularia on the kidneys: Polygonum Bistorta on the liver: Salvia Multiorrhiza on the heart. The true wild-growing root from Manchuria is most prized.—From Stuart's Chinese Materia Medica. As much as would lie on a penny was taken thrice daily without any noticeable effect.—H. Gilbert Carter, Sept., 1926.

Glaucium Luteum.—Yellow-horned or Sea Poppy. 1 drachm doses of Liquid Extract have been given in glycosuria. The alkaloids Glaucine, Protopine and Chelerythrine are present.

Gloriosa Superba, *N.O. Liliaceæ.* A poisonous plant common in Upper Burmah. Contains Colchicine.—Clewer, Green and Tutin, J. C. S., 1915, 107,835; F. L. Pyman, C.D., July 31, '15,164.

Glucosides. Principles found mainly in plants, possessing the property of being converted into glucose or an allied sugar and one or more simpler or more complex products by the action of dilute acids, alkalis, enzymes or simply by heating with water and taking up the elements of water in the

reaction, *i.e.*, hydrolysis. Examples are Amygdalin, the Digitalis Glucosides, Phloridzin, Salicin; Bourquelot on.—B.M.J. i./21,59.

A review of Glucosides.—J. E. Driver and G. E. Trease, P.J. i./27,622.

Recent work on.—E. G. Bryant, P.J. i./28,213.

Glycogen $[C_6H_{10}O_5]n$.—A body allied to starch—a white odourless powder soluble in water with opalescence, insoluble in alcohol. *Dose.*—1½ to 2 grains. It occurs in the liver, blood, horsefiesh, etc. It is said to be changed at death into glucose, maltose and isomaltose; given medicinally said to improve nutrition.

Glycyrrhiza. *Dose.*—5 to 20 grains or more. The peeled root and subterranean stem of *G. glabra* (*Leguminosæ*)—*B.P.* '14. Aqueous extraction usually yields 24 to 38% **Solid Extract.** *Dose.*—5 to 60 grains. **Extract Liquid** (*B.P.* '14). By cold exhaustion with Chloroform Water 1=1, contains ⅕ of its volume of 90% alcohol. *Dose.*—½ to 1 drachm. Incompatible with acids.

Elixir Pectorale.—*Syn.* **Liquor Pectoralis. P. Dan.** King of Denmark's Chest Mixture. *Dose.*—1 drachm. Extract of Liquorice 1, Fennel Water 3, Anisated Liquid Ammonia 1. *Note a further form below.*

(**Liquor Ammonii Anisatus.**—*Syn.* **Esprit Ammoniacale Anisé** consists of Oil of Anise 1, Alcohol 25, Solution of Ammonia 5. Several of the Foreign Pharmacopœias gave similar formulæ, *e.g.*, that of P. Dan. 1908 and P.G. VI.)

Liquor Pectoralis, P. Svec. X. Licorice Extract 200, Fennel Water 600, Ammonia Solution 9% 35, Anise Oil 2, Alcohol 90% 163. *Note a further form above.* Ⓟ **Liquor Pectoralis Benzoicus, P. Svec. X.** Tinctura Opii Benzoica 1, Liquor Pectoralis 3.

Glycyrrhizinum Ammoniatum. *Dose.*—½ to 5 grains. Glycyrrhizin is contained in the root as the Ammonium Salt—*further details Vol. II.* Readily soluble garnet coloured, shining scales. It possesses a persistent sweet taste. The acid precipitated from it is bitter-sweet. A grain will flavour 6 ounces of water. It may, perhaps, be considered as the Ammonium Salt of Glycyrrhizinic Acid which, according to Tschirch, has the formula $C_{41}H_{61}O_3(COOH)_3$.

Liquorice preparations cover the taste of ammonium chloride, alkaline iodides, cascara, magnesium sulphate, quinine sulphate, ipecacuanha, and aloes, hence is in Mistura Sennæ Composita, Decoctum Aloes Compositum and Confectio Sennæ.

In addition to the extracts, dried 'Liquorice Juice,' or 'Spanish Liquorice, is sold, that bearing the stamp of Solazzi being most prized. Pontefract Cakes of Liquorice and 'Pipe Liquorice,' are useful in allaying tickling coughs.

Trochisci Glycyrrhizæ, Brompton H., commonly known as 'Brompton' Cough Lozenges, or 'Brompton Blacks,' contain Liquorice Extract 3 grains, Anise Oil ½ minim in each (Acacia basis). **Pastilles de Réglisse.**—Liquorice pastils, much used in France.

Pulvis Glycyrrhizæ Compositus. (*B.P.* '14). *Syn.* PULVIS PECTORALIS (*Kurellœ*). Senna and Liquorice of each 2, Fennel 1, Sublimed Sulphur 1, White Sugar 6½. Mix.

Dose.—1 to 2 drachms, mixed with water or milk, taken early in the morning, is a mild and agreeable laxative. For constipation and hepatic disease, it is pleasant to take, and effectual without catharsis. U.S. uses oil of fennel, which makes it less granular. It is also prepared *sine Saccharo* (Hewlett)—with *half* the above dose, more palatable.

Poudre de Réglisse Composee. *Syn.* PULVIS LIQUIRITIÆ COMPOSITUS FR. CX. contains Liquorice 1½, Senna (washed with alcohol and powdered) 1½, Fennel 1, Sublimed Sulphur 1, White Sugar 5.

Species Pectorales. P.G. VI. Coarsely cut Marshmallow Root 8, Liquorice Root 3, Orris Root 1, Tussilago Farfara (Coltsfoot) Leaves 4, Verbascum Flowers 2, Anise 2.

Gokhru.—The prickly fruit of *Pedalium Murex.* A remedy for nocturnal seminal emissions, incontinence of urine and impotence. Is rich in mucilage. Of an infusion 1 in 10 of boiling water (stand 2 hours) half a pint is a daily dose. Should be freshly made. **Liquid Extract** 1=1, made with Alcohol 90%. *Dose.*—20 to 60 minims. Burra Gookeroo is believed to be identical with *Pedalium Murex fruit.* It is used similarly in India, though by some it is identified as *Tribulus lanuginosus* (*Zygophyllaceæ*). **Guaycuru** (*Statice braziliensis*). Emmenagogue (?) Infusion, taken freely. Astringent. For dysentery.—Ph. Notes, River Plate.

Guarana. P. HUNG. *Dose.*—10 to 60 grains in powder, or infused in a cup of boiling water. The seeds of *Paullinia Cupana*, *P. sorbilis* (*Sapindaceæ*), roasted and moistened with water, made into a hard paste, rolled into cylinders, and dried. Imported from Brazil. The drug contains 2·5 to 5% **Guaranine**, which is identical with caffeine, *q.v.*, together with tannin gum, etc. Is recommended for sick-headache. A nervine tonic. *Dose.*—½ to 5 grains or more. Methods of preparation of Guarana by the Guarani Indians.—P.J. ii./10,577. **Liquid Extract.** *Dose.*—½ drachm. Standardised to 4 Gm. (average) Alkaloids in 100 Cc. Prepared by percolation with Diluted Alcohol. **Tincture.** *Dose.*—½ to 1 drachm. Macerate Guarana 1, in Alcohol 60% *q.s.* to produce 4.

Gymnema Sylvestre (N.O. *Asclepiadaceæ*). An Indian creeper whose leaves when chewed relieve sweet taste of sugar. Decoction of powdered leaves has been used in diabetes, but found of no value.—Chopra, Bose and Chatterjee, per Pres., Dec., '29,421.

Hæmatoxyli Lignum, Logwood. (*B.P.* '14.) The unfermented heart-wood of *Hæmatoxylon Campechianum* (*Leguminosæ*). Of sweetish astringent taste. The fermented chips used by dyers are deep red in colour, have lost the sweet taste and the hæmatoxylin is oxidised to *Hæmatein*, $C_{16}H_{12}O_6$.

Preparations of logwood, colour the fæces and urine red, and stain linen.

Incompatible with acids and lime water. Certain metallic salts (notably iron) produce blue colour; mercuric salts brown. The decoction is a remedy for diarrhœa and some forms of urinary hæmorrhage. **Liquid Extract, B.P.C.** 1=1. *Dose.*—½ to 2 drachms (2 to 8 Cc.). **Extract.** An aqueous extractive completely soluble in water. *Average dose.*—15 grains.

Decoctum Sappan 1 in 20 of **Sappan** Wood (*Cæsalpinia Sappan*, *Leguminosæ*) is *B.P.* '14 and is similar to Logwood.

Hæmatoxylin. $C_{16}H_{14}O_6+3H_2O=356{\cdot}156$. Usually in yellowish granular crystals, slowly soluble in water, easily in alcohol. Alcoholic Solution 0·2% is used as indicator—yellow in acid and purple in alkaline solution. Also for staining in microscopy, *vide Vol. II.*

Logwood cultivation in Jamaica.—P.J. i./26,328.

Harmine and **Harmaline.** Alkaloids contained in the seeds of *Peganum Harmala*, a strong-smelling herbaceous plant *N.O. Rutaceæ*. It is the Wild Rue of Dioscorides. Further details on Botany, Chemistry and Pharmacology, 17th Edn., p. 799. (**Banisterine** from *Banisteria caapi* is an identical alkaloid chemically and pharmacologically.)

The pharmacology of Banisterine and Harmine, showing they are identical.—J. A. Gunn, L. i./29,1140; P.J. i./29,220.

Harmaline has a toxic action on trypanosomes *in vitro*, but no curative effect on the disease in man. It is thought inferior to Quinine for acute malaria. Harmine failed to cut short acute attacks. In three cases of relapsing fever it proved remarkably successful.

Trypanosomiasis treated by Harmala alkaloids (Gunn)—not found curative. Review of tropical diseases.—R. Hewlett, Pr., April, '21.

Harmine has been used in Parkinsonism. Harmaline and Harmine were tried in malaria.—J. A. Gunn, L. i./29,769.

Harmine 0·04 Gm. hypodermically thrice daily useless in Parkinsonism, causes toxic symptoms.—T. R. Hill and C. Worster-Drought, L. ii./29,647,675.

Harmine—a therapeutic revival.—Per Pres., June, '29,225: see also *ibid.* Sept., 29,312.

Harmol and **Harmalol** are two further alkaloids which have recently been introduced. Harmol differs from Harmine by the substitution of a Phenolic for a Methoxy group, and Harmalol differs from Harmaline in the same manner and this substitution diminishes the toxicity for mammals and for protozoa and abolishes the convulsive action.

Harmalol is only 1% soluble in cold water. Harmalol Hydrochloride in doses of 4/5 grain hypodermically or by mouth has slight but definite effect in relieving muscular rigidity in Parkinsonism, but has no effect on the tremor or mental condition and does not relieve salivation. Not so good as Hyoscine but of value as an adjuvant.—H. A. Cooper and J. A. Gunn, L. ii./31,902.

Recent pharmacological studies suggest Harmol as one of the most powerful coronary dilators, having marked effect, 1 in 200,000, on rabbits. Suggested for clinical trial in angina pectoris.—J. A. Gunn and R. C. MacKeith. Qtrly. Jl. Ph., '31,33.

Hedera Helix (*Araliaceæ*). **Ivy**—juice of leaves has been used to ulcers. The berries are said to be purgative.

Leaves of ordinary common Ivy, taken by a child, caused poisoning. Intense scarlatiniform rash produced (as in the case of Rhus toxicodendron). Emetics failed to act. The stomach was washed out and a stiff dose of Castor Oil was given.—P. H. J. Turton, B.M.J. ii./25,294.

Hederin—a glucoside with Digitalis-like action, but is injurious to the heart and blood corpuscles.—B.M.J. i./12,61.

Heliotropin, $C_6H_3O_2CH_2COH = 150{\cdot}0468$. *Syn.* Piperonal, a Methylene derivative of Protocatechuic Aldehyde, when pure is in shining white flaky crystals with Coumarin odour, slightly soluble in water, freely in alcohol, much used in perfumery. Usually manufactured by oxidation of safrol with chromic acid.

Helonias dioica.—False Unicorn Root. Is used in colic and in atony of the generative organs; also employed as an abortifacient.

'Helonias Compound.' Aloes 9 oz., Helonias 14 oz., Tansy 14 oz., Oil of Pennyroyal 1½ oz., Oil of Cassia 1 drachm, Cayenne ¾ oz., Myrrh 8½ oz. in 1 gallon of 17% Alcohol. *Dose.*—1 drachm in a cup of hot water, sweetened, twice daily. For promoting menstruation. A case in which a man was proved guilty of supplying a noxious drug to procure miscarriage.—P.J. ii./24,342.

Sometimes known as Egyptian Privet—it resembles common privet.

Henna, *Lawsonia inermis* (*Lythraceæ*). The powdered leaf is employed as a hair dye, usually in conjunction with indigo, *e.g.*, the following:—Apply a paste of Henna 1, Indigo 2, for varying periods according to the shade required—one hour for light brown. 1½ hours for darker—should be tried experimentally before use. Henna stains the skin as well as the hair. In some cases Cupric Chloride and Pyrogallol are used in conjunction with Henna, and again Borax is occasionally an adjuvant, the idea being no doubt that the pyrogallol oxidises more readily in alkaline solution. The quantities relative to the Henna in such cases are exceedingly small. It is employed internally and locally in jaundice, leprosy, and skin affections.

For an account of History, Botany, Cultivation and Chemistry of Henna and Shampoo formula, see E. M. Holmes, P.J. i./24,437.

The constitution of Lawsone.—J.C.S.A. i./20,626.

Holarrhena Antidysenterica (*Apocyanaceæ*). *Syn.* according to some, Wrightia Antidysenterica, Bengali *Kurchi* or *Coorchi*, a small deciduous tree found throughout India. An infusion of the bark (and seeds) has remarkable effect in dysentery. The plant, as also *H. Congolensis* from the Congo contains **Conessine** $C_{12}H_{20}N$. This alkaloid has strong inhibitory action on amœbæ—equal to that of Emetine. It is 50% less toxic than the latter. Conessine salts can be given *per os* and intravenously, but subcutaneously it produces necrosis at site of injection. Suggested dose of Powdered Bark 2 to 5 grains. A **Liquid Extract** 1=1 was tried with good result.—I.D.C., 1916; H. C. Brown, B.M.J. i./22,963; F. L. Pyman, J.C.S.T., Feb., 1919, p. 163. **Kurchi Tablets** are made 5 grains.

Antidysenteric value compares favourably with any other remedy in vogue and depends on use of entire seed or bark. Recommended daily dose of 60—120 grains of powdered bark in 3 or 4 portions.—L. i./28,39; see also T. A. Henry and H. C. Brown, *ibid.*, 108.

Amœbic Dysentery.—Comparative treatment of 154 cases with Alcresta Ipecac, Emetine injections, Emetine injections plus Bismuth *per os*, Emetine Bismuth Iodide, Yatren, Stovarsol and Kurchi Barck, showed that the last two gave the best results, the ratio of probable cures to failures in each of these cases being 1 : 1·1.—R. Knowles, I.M.G., Aug., '28, per L. ii./28,714. Total Kurchi Bark alkaloids used with success in amœbiasis—2 grain doses intramuscularly or liquid extract orally.—Per M.A., '31,17.

Kurchi Bismuth Iodide. *Dose.*—4 grains twice daily for 10 days in amœbiasis. In acute amœbic infections nine ½ to 1 grain doses of the total Kurchi Bark advised.—H. W. Acton and N. R. Chopra, I.M.G., Sept., '29, per M.A., '31,17.

Holarrhena var. also contain the alkaloid **Holarrhenine.**

See also our page 527.

Hordenine. *p*.Oxy-phenyl-dimethyl-ethylamine. $C_6H_4OHC_2H_4N(CH_3)_2$. Alkaloid obtained from barley in the process of malting. Leger, *Comptes Rend.* 142 (1906) 108; 143, 234, 916. The compound has been synthesised. Refs. 18th Edn., p. 834. The substance resembles Tyramine *q.v.* *Dose* uncertain, but 1 Gm. has been given. Suggested in hyperchlorhydrosis, enteritis and diarrhœa.

Hydrangea (*Saxifragaceæ*). A decoction of the plant (*H. Arborescens*) is

stated to have been used with advantage by the Cherokee Indians in calculu diseases.—U.S.D. (Liquid Extract of Hydrangea may be prepared 1=1 wit 45% Alcohol.)

Hydrocotyle asiatica, Ph. Ned. V. Water Pennywort Leaves. The umbelli ferous herb is used in India for skin diseases and ozæna in 4 to 10 grain dose internally; it is added to lard as an ointment, also to poultices, and used a snuff in ozæna. Contains 15% of a volatile oil.

Hydroxylamine, $NH_2OH = 33{\cdot}0314$. Its strong reducing and antisepti properties suggest its use in tinea and psoriasis. Does not stain the skin The HYDROCHLORIDE, $NH_3OH.HCl = 69{\cdot}496$, is freely soluble in water. Solu tion 1 in 1,000 of equal parts of glycerin and alcohol or ointment with adep lanæ, successful in lupus, ringworm and parasitic sycosis. May produc smarting.

For notes on Manufacture, Chemical and by Electrolysis of Nitric Acid, se Edn. XIX, p. 863.

Hydroquinone. *Syn.* QUINOL, HYDROCHINON. $C_6H_4(OH)_2$ 1 : 4 = 110·0468 *Dose.*—½ to 5 grains. An isomeride of Resorcin $C_6H_4(OH)_2$ 1 : 3, and Pyro catechin 1 : 2.

For a note on Chemical Method of Manufacture, see Edn. XVIII, p. 835.

Electrolytical deposition is more economical than the chemical metho Theory of the reaction.—P.J. i./16,3.

Poisoning by Hydroquinone—20 grains recovered from dejecta.—A. Mitche and J. Webster, B.M.J. ii./19,465.

Soluble 1 in 20 of water, in alcohol about 1 in 4. It possesses stronge antiseptic and antipyretic properties than Resorcin. Is used as a photograph developer, *q.v.*

Hysterionica. *Syn. Aplopappus Baylahuen* (*Compositæ*) *Remy.* Fro Chili. Recommended in malarial and chronic dysentery, flatulent dyspepsi and diarrhœa. **Liquid Extract.** *Dose.*—5 to 15 minims.—N.S.D., p. 1394.

℞ **Ibogaine.** $C_{52}H_{66}N_4O_2 = 806{\cdot}5628$. An alkaloid obtained from th Iboga (*syn.* aboua, or obouete or liboka) (N.O. *Acanthaceæ*), *Tabernanth Iboga*, Baill., a plant growing in West Africa, particularly the Congo. Sai to have aphrodisiac and sustaining powers. Too large a dose may produc tetanus and convulsions. The plant has been tried in sleeping-sickness The base is soluble 1 in 28 alcohol 95% at 15° C. Insoluble in water. M.p 151° C. Its solutions are lævorotatory. In solution the substance oxidise but keeps well in crystalline form. It has been given in *dose* 0·005 Gm (1/12 grain). ℞ **Ibogaine Hydrochloride** has been given in influenza, and i angina pectoris and other heart affections.

Ichthyocolla (P. Belg. IV., F.E. VII, P. Ital. V.) Isinglass. The swimmin bladder of certain species of the sturgeon and hake; dried and sliced int thin pieces. About 3 drachms to the pint of warm water forms a jelly. I used for refining wine. Added to milk to prevent formation of tough curd difficult of digestion. Isinglass Plasters on Muslin, 8 inches wide, yard roll (also 11 inches by 5 yards). Also Tapes, ¼, ½ and 1 inch, 10 yard length Also Isinglass on Silk, 7 inches wide, flesh-coloured, black and white, ar made. P. Jap. gives method of making Court Plaster.—"Emplastrum Adhæsivum Anglicum."

Sinclair's Glue.—Glue 50, water 50, glycerin 2, calcium chloride 2, thymol 1 For applying extension in fractures instead of plaster. Melt on water bat when required and apply with the hand, using a bandage if necessary.

The following is more elastic:—Isinglass 50, glue 50, water 50, calciu chloride 2, tannin 12, glycerin 2, thymol 1.—B.M.J. ii./17,60.

The Thymol content is excessive. One-tenth of the amount in either o the above is ample. 'Blistering' of the skin has occurred in its use whic we attribute to the amount of Thymol.—W. H. M.

Inula Helenium (*Compositæ*).—Elecampane. Root contains Inulin allie to Starch and Helenin. *Dose.*—¼ to 2 grains a stearoptene, in white crystals insoluble in water, but freely in alcohol. Is antiseptic, used in ozœna, keep off insects, and internally for phthisis, malarial fevers, infantile and catarrha diarrhœa; checks bronchial secretion. **Inulin** from this and from Dahlia and Helianthus is the same. It is present in Burdock root to the extent o 45%, Dahlias 20%.—Holmes. **Extractum Inulæ Liquidum.** 1=1. *Dose.*— 10 to 60 minims. **Extractum Helenii** (solid) is also made.

Ipomœa batatus is the **Sweet Potato** which is used as a vegetable in man parts of the world—Persia, India, Japan, China, etc.

The roots contain from 3 to 10% of sugar and 9 to 15% of Starch, which occurs in larger proportion in plants grown in sub-tropical countries. The Starch is a commercial product and is known as Sweet-Potato Starch.—Kraemer. *cf.* Maranta, *postea.*

Ipomœa. *B.P.* '14. *Syn.* Orizaba Jalap Root. Mexican Scammony Root. Dried root of *I. orizabensis* Ledenois (*Convolvulaceæ*). To yield not less than 15% total resins.—U.S. X. **Resina Ipomœæ** U.S. X. is prepared by adding water to the Alcoholic Extract. *Dose.*—3 grains. *See Jalap.*

Iridin. *Syn.* **Extractum Iridis.** *Dose.*—1 to 3 grains in a pill alone or with extract of henbane, or with one grain of Euonymin.

The dark brown powdered extract made with Alcohol 60% from the root of the blue flag, *Iris versicolor* (North America). Has a bitter, acrid taste, possesses cathartic, alterative and diuretic properties, given in hepatic and intestinal disorders.

Iris Florentina, I. Germanica, etc. (Italy), yield **Orris Root** of perfumery, containing '**Butter of Orris**' about 0·15%, a sweet-scented fatty substance. *Tinctura Iridis* is prepared from the root, 1 in 8 Alcohol 90%.

Sneezing treatment for prevention of adenoids satisfactory. Powdered Orris Root and soap used to lightly touch the nasal septum. It is not sniffed up the nose.—L. ii./18,240.

Ispaghula, *B.P.* '14. *Dose.*—45 to 150 grains. Pinkish brown boat-shaped seeds of *Plantago ovata* (*Plantaginaceæ*). Much valued as demulcent = Linseed or Barley.—Decoctum. *Dose.*—½ to 2 ounces. 1·5% in water.

Has beneficial mechanical action in chronic dysenteries.—R. N. Chopra, I.M.G., Aug., '30, per M.A., '31,159.

Ixora Coccinea. *Syn.* FLAME TREE. *Dose* of the powdered drug.—30 to 45 grains with aromatics. In dysentery. **Tincture.** *Dose.*—1 to 1½ drachms in water twice or thrice daily as tolerated, increased if necessary. 1 in 5 alcohol 60%. **Mistura.** *Dose.*—One ounce thrice daily as tolerated, increased if necessary. Tincture of Ixora 1 ounce, Peppermint Water to 8 ounces.

Jalapa. *Syn.* BRYONE OR MECHOACAN NOIR. *Dose.*—5 to 20 grains. The dried tubercles of *Ipomœa Purga* (*B.P.* '14), *U.S. Exogonium Jalapa* (*Convolvulaceæ*). A powerful purgative producing watery stools, is apt to gripe; must be avoided if the bowels are inflamed. Used to reduce dropsy of Bright's disease, and to relieve uræmia. The **Extract** (*Dose.*—2 to 8 grains), **Resin** and **Tincture** are mostly used. **Tinctura Jalapæ Composita.** *Dose.*—½ to 1 drachm. Contains 8% Jalap with Scammony Resin and Turpeth. A modification of B.P. Assay Process.—H. E. Dale, P.J. ii./27,516. See also D. B. Dott, P.J. i./30,213,287.

Jalapæ Resin, P.G. VI., P. Ital. V., F.E. VIII., P. Belg. IV. and **U.S.** *Dose.*—2 to 5 grains. Contains two glucosidal resins, about 90% Convolvulin (*Syn.* JALAPURGIN), soluble in alcohol, but insoluble in ether [this should be termed JALAPIN, as understood in England (*dose* 1 to 5 grains)], together with about 10% Jalapin (Mayer), (*Syn.* ORIZABIN), soluble in ether and in alcohol. The latter, the principal constituent of spurious Jalap (*Ipomœa simulans* and *I. orizabensis*), is identical with **Scammonin** (*dose,* 1 to 5 grains) from scammony root, *Convolvulus Scammonia* (*Convolvulaceæ*). It is cheaper and less active. The average yield of resin from Jalap is about 10%. FR. CX. requires 7%. *B.P.* '14 requires to contain not more than 15% ether-soluble. *For further data on Jalap and Scammony Resin, see Vol. II.*

Pulvis Jalapæ Compositus (*B.P.* '14). *Dose.*—10 to 60 grains. Contains 30% Jalap with Ginger and Acid Potassium Tartrate.

A new Jalap resin, known as '*Regina de Batata de Purga,*' and extracted from the tubercle of *Convolvulus Operculatus,* is extensively used in Brazil. It possesses the same properties as the official Jalap, but is practically devoid of any subsequent constipating action. *Dose.*—0·25 to 2 Gm.—C. & D. i./25,854.

Juglandin.—An extractive prepared from the inner bark of the root of *Juglans cinerea,* the North American butter-nut; is an hepatic stimulant and cathartic. *Dose.*—2 to 5 grains in pill. **Spiritus Nucis Juglandis,** distilled from *Juglans regia,* the common European walnut, is an antispasmodic and for checking sickness of pregnancy. *Dose.*—1 to 4 drachms. **Folia Juglandis** are in P. Austr.: also in P. Belg. (and Fluid Extract) and P. Helv. **Walnut hair dye.** A formula for this was given in Edn. XVIII, but it is not satisfactory. Certain hair dyes of the kind owe their efficacy to aniline dyes.

Juglane. A French preparation of the European Walnut (*Fr. Noyer*), for use in diabetes.

Juniperi Oleum. Oil distilled from fruit of *Juniperus Communis* (*Coniferæ*) and 'rectified.'—*B.P.* '14. Sp. Gr. 0·862 to 0·890, increasing with age. Soluble (when freshly distilled) 1 in 4 of 95% alcohol, becoming less soluble with age. Resembles Turpentine in medicinal uses. A genito-urinary stimulant. **Spiritus** 1 in 10. *Dose.*—5 to 20 minims. **Spiritus Juniperi Compositus.** *Dose.*—2½ drachms. Oil of Juniper 8, Oil of Caraway 1, Oil of Fennel 1, Alcohol (99%) 1,400, Water to 2,000. Terpeneless and Sesquiterpeneless Juniper Oil is stable and soluble in comparatively weak alcohol. **Vinum Diureticum,** P. Helv. *Dose.*—¼ to 1 ounce. Juniper 15, Squill 10, Orange Peel 10, Absinthe 5, Angelica 5, Sweet Flag 5, Dry Southern Wine 1,000.

Oleum Juniperi Ligni. A trade name for Fictitious Juniper Oil supposed to be made from the wood, but is generally a mixture of Juniper Berry Oil and Turpentine; *cf.* also Juniper Tar Oil.

Kaladana (*B.P.* '14). *Syn.* PHARBITIS SEEDS. *Dose.*—30 to 45 grains. Dried seeds of *Ipomœa hederacea* (*Convolvulaceæ*). Purgative and Anthelmintic—equivalent Jalap.—Give dose 60 to 120 grains.—I.D.C.

Pulvis Kaladanæ Compositus, *B.P.* '14. *Dose.*—10 to 60 grains. Kaladana 30%. Equivalent to Pulvis Jalapæ Compositus. **Tinctura,** *Dose.*—½ to 1 drachm. 1 in 5 of Alcohol 70%. **Kaladanæ Resina.** *Dose.*—2 to 8 grains. Useful hydrogogue.—I.D.C.

Kala signifies *black* and *dana* means seed. Other seeds are collected in place of genuine. Chemical and Histological Research on the seeds and resin.—H. C. Kassner, P.J. i./24,155,182,207,231,261,306,328,357.

Kauri Gum. A resin obtained from *Dammara Australis* in Australia and New Zealand. **Dental Compo.** Contains Kauri Gum. This is used for taking impressions of the mouth and teeth for plate preparation. *Directions.*—Place the cake of Compo in moderately warm water for about two minutes or so to soften—do not employ boiling water. The Compo should be kneaded with the wet fingers until it has hardened somewhat; by this proceeding it becomes almost cool. The Tray should be warmed for a short time before placing the Compo into it. The surface of the Compo is then smoothened with the hand, a little vaseline is rubbed on the surface, and the tray is held for a second or two over a Bunsen flame. It is very important that the surface of the Compo should be heated in this way before inserting into the mouth. After inserting wait for 2 or 3 minutes. On removal, place the tray bearing the impression in cold water.

Kauri 'Gum.' Its collection and commerce.—Jas. B. Aitken, P.J. i./15,550.

Kava-Kava. *Syn.* **Awa Root,** *B.P.* '14.—*Piper methysticum* (*Piperaceæ*) rom the Polynesian Islands. **Liquid Extract.** *B.P.* '14. 1 in 1 of alcohols 90 and 45%. *Dose.*—30 to 60 minims. In gonorrhœa it is not equal to copaiba or santal oil. *Further data Edn. XIX, p.* 865.

Kino (*B.P.* '14). U.S. X. *Dose.*—5 to 20 grains. The dried juice from trunk of *Pterocarpus Marsupium* (*Leguminosæ*). Partly soluble in water, almost entirely in alcohol 90%, nearly insoluble in ether. Astringent for diarrhœa, and as **Trochisci** for relaxed condition of the throat. Its powder is also insufflated to check epistaxis. **Tincture,** 1 in 10 of a mixture of Glycerin, Alcohol and Water. U.S. 1 in 10 of equal parts alcohol (94·9% vol.) and water. *Dose.*—30 to 60 minims. The tincture may gelatinise, due to enzymes. ***Incompatible*** with mineral acids and alkalis and with substances precipitable by the tannin it contains.

The constitution of Kino Tannin, with list of references to the literature relating to Kino.—A. McGookin and I. M. Heilbron, Jl. Ph. & Exp. Ther., Jan., '26,421.

Butea Gum.—Bengal Kino may be used to replace in certain parts of the Empire.

Krameriæ Radix. Rhatany Root (*B.P.* '14). The dried root of *Krameria argentea* (Para) and *K. triandra* (Peruvian). Both contain about 8% of a tannin. Astringent in relaxed throat, also in tooth powders when gums are liable to bleed, and in mouth washes, also for bleeding from nose and bowels, and for diarrhœa. **Tincture** (*B.P.* '14). 1 in 5 of 60% alcohol by percolation. *Dose.*—30 to 60 minims. Should yield 5% extractive. *Flavoring.*—Glyl Menthæ Viridis vel Piperitæ, Glyl Pini; Glycerin, Syrupus Aurantii. **Trochisci** are made with the Extract, as also [B][P] with Cocaine Hydrochloride ⅒ grain.

Kratom.—Leaves of *Mitragyne speciosa* are chewed by the natives of Siam

and Bangkok. Habit-forming, but not harmful. Used as restorative; enables workers to withstand great fatigue and torrid heat.—C.D. i./30,702.

Kukui Oil. *Syn.* Candle Nut Oil from New Zealand, Fiji, Hawaii, etc. obtained from the seeds of *Aleurites Tribola. Syn. A. Moluccana* (in Index Kewensis)—in amount equal to 60·8% of the decorticated nuts or 19·8% of the unshelled seeds. Sp. Gr. 0·920—0·9274, S.V. 184—204·2, I.V. 114·2—163·7. Medicinally it has cathartic properties. Suitable for soap, varnish making and other uses. Dries more quickly than linseed oil.

Labdanum. *Syn.* **Ladanum,** the exudate from *Cistus var.* was employed in the war by the Greeks for wounds.—Sir Charles Ballance, L. i./20,5.

Lachnanthes Tinctoria.—Spirit Weed, Red Root. A tincture=1 in 10 of proof spirit of this United States plant; is used to check the cough in phthisis. *Dose.*—1 to 10 minims. References to Alabone's treatment by Lachnanthes: 17th Edn., p. 805.

Lactose.—**Saccharum Lactis,** $C_{12}H_{22}O_{11},H_2O=360·1872$. Milk Sugar. *Dose, ad lib.* Used for weakly children. Is said to be a useful addition to Magnesia as a laxative, it increases the solubility of the latter by combination.

The organisms capable of fermenting Lactose are less frequently present in normal mouths than those in which dental caries exists—a point which must have some bearing on the etiology of dental caries.—Sir Kenneth W. Goadby, L. ii./09,1896.

Government Lactose Factory at Crewe under Ministry of Agriculture. Previously valued at £19,000, sold for £3,000.—C.D. i./27,393.

A dose of ½ to 1 oz. in the morning in a large cup of weak tea a useful laxative. Of value in flatulence and spasm of the colon.—T. C. Hunt, L. ii./31,872.

Laminaria Digitata, 'Sea Tangle.' From this seaweed '**Laminaria Tents**' are made for gynæcological and surgical use. Placed in contact with moisture they swell to three times their original size in dry state. The Laminaria is sterilised by drying after immersion in acetone, chloroform or alcohol 90% under pressure at 133° C., or by placing in Saturated Solution of Iodoform in Ether or in Sublimate Solution.

Lappa. Burdock. Roots of *Arctium Lappa,* Linné, or other species of Arctium. On the Continent called Bardana, *e.g., Inf. Bardanæ Spirituos* (external): Bardana 2, water (boiling) *q.s.* to 15, strong alcohol 5, to be rubbed into the scalp. Ph. Notes, Denmark. **Liquid Extract,** 1=1 by Diluted Alcohol. *Average dose.*—30 minims. In skin affections and gout.

The use of a tincture of the seeds has largely replaced that of the root in U.S.A., especially in the treatment of psoriasis, acne and prurigo.—C. & D. i./25,216.

Lasiosiphon (*Lasiosiphon Meisneri*). *Dose.*—2 to 5 grains.

The root of this South African drug resembles Mezereon in its properties (there are several species—this is considered the most active). The bark of the root when chewed produces a scorching sensation, due to acrid resin, in about fifteen minutes. **Tincture** of the root 1 in 10 Alcohol 90%. *Dose.*—10 to 60 minims. Found efficacious in chronic skin affections. **Liquid Extract.** 1=1. *Dose.*—2 to 5 minims. **Lasiosiphon Bassorin Paste,** consisting of the Liquid Extract thickened with 3% Tragacanth; may be of service for local use. **Lathyrus Sativus.**—A poisonous horse pea.—P.J. i./13,795.

Lathyrism and other plant poisons.—B.M.J. ii./25,847. See also Ralph Stockman, Jl. Ph. & Exp. Therap., Sept., '29,43.

Lauri Fructus.—*Laurus nobilis* (*Lauraceæ*). The ripe fruit, Laurel or Bay Berries, contains fixed 30% and volatile oil 1%. In rheumatism. **Leptandrin.** *Dose.*—¼ to 2 grains. A resinoid powder obtained from Culvers Root, *Leptandra* (*Veronica*) *Virginica* (*Scrophulariaceæ*). Supposed to promote the flow of bile without irritating the bowels; useful in dyspepsia. Acts well with podophyllin. **Liquid Extract.** 1=1 of Leptandra by diluted alcohol. *Average dose.*—15 minims. Solid Extract (Powder form, 1=4) of drug by concentrating same and adding Glycyrrhiza. *Average dose.*—4 grains.

Levisticum officinale.—Lovage. A decoction in milk (a fresh leaf and stalk to a quart), allowed to simmer 2 hours. *Dose.*—3 to 5 ounces. For renal dropsy.

Limonene. *Dose.*—10 to 20 minims (on sugar or in water).

This Terpene exists in several modifications, the *dextrorotatory* ($[\alpha]_D = +106·8°$) is contained in Lemon, Bergamot, etc., Oils, the *lævo* ($[\alpha]_D = -105°$) is in Pine Needle Oil and Peppermint Oils. *Inactive* Limonene (=Dipentene —*i.e.*, + and − Limonene in equal amounts) is contained in Oil of Camphoe

Swedish and Russian Terpentine Oil, etc. They do not differ greatly in taste and odour.

Limonene has been used in place of Turpentine Oil both by inhalation and internally. Stated to be of value in pulmonary disease associated with copious expectoration, *e.g.*, purulent bronchitis, bronchiectasis, gangrene and phthisical cavities. As a deodorant of foul smelling expectoration it is said to act well. Sputum decreases in amount. The substance is also valuable as a stomachic and externally in stimulating liniments.

Dermatitis in marmalade workers due to irritant action of Limonene present in both orange and lemon peel. Grease a preventive.—S. G. Horner, L. ii./31,961.

Lemon Syrup. Two formulæ: Lemon Oil 1 minim, Alcohol 90% 20 minims, Syrup to ½ ounce, or dissolve Citric Acid 2 in Lemon Tincture 5, strain if necessary, and add Syrup 50; *vide* also *infra*.

Tinctura Limonis.—We have found the following formula of P. Boa equal in flavour to the B.P. formula, as follows: Fresh Lemon Peel, cut small, 25, alcohol (90%) 52 and distilled water 48 mixed. Prepare by maceration. This, is, therefore, weaker in spirit than the usual. For Syrup of Lemon.—Citric acid 4 ozs., sugar 5½ lbs., distilled water 42 ozs. or *q.s.* tincture of lemon as above 5 ozs. Heat the water to boiling, add first the sugar, then the citric acid, and stir till dissolved. When cold add the tincture of lemon, and mix by shaking. Finally, add distilled water *q.s.* to make to 100 ozs. This Syrup we find as good as, if not better than, the B.P. Syrup. The taste is sharper—it is somewhat stronger in Acid, we found by titration about 25% stronger. *For Oleum Limonis vide Vol. II.*

Tinct. Limonis Fort. B.P.C. contains little A or C Vitamin, but contains almost as much B as Yeast.

Cortex Limonis B.P. found to contain appreciable amounts of Vitamin.—S. G. Willimott and F. Wokes, P.J. ii./25,164; ii./26,184.

Linum.—Seeds of *Linum usitatissimum* (*Linaceæ*). Decoction, 1 in 20, demulcent or crushed for use as a poultice. Contains Oleum Lini, 30 to 40%. Sp. Gr. 0·930 to 0·940 I.V., not less than 170. Used as enema and with lime water as Carron Oil, *q.v.* Flax Seed or Linseed (*Grains de Lin* in France). In habitual constipation. One teaspoonful to be taken floating in a tumbler of water before breakfast. Appears to act better than Agar-Agar. Tung Oil from *Aleurites Fordii*, irritant and poisonous, is a substitute for Linseed Oil.—Lewkowitsch gives particulars.

Linseed, two teaspoonsful taken whole with water for deficient bulk in intestinal contents in constipation.—W. Glegg, B.M.J. i./31,206.

Lonicera Periclymenum.—Common honeysuckle and *L. xylosteum* (fly honeysuckle).—(*Caprifoliaceæ*) Flowers or berries are poisonous.

Luctin.—An extract from the Locust Bean Kernel (*Ceratonia Siliqua*, N.O. Leguminosæ). Used largely in the manufacture of foodstuffs, and is supplanting Gum Tragacanth as being more economical. To make a jelly or mucilage add powder slowly to water, stir and boil.

Lupulinum. (*B.P.* 1898.) *Dose.*—2 to 5 grains in pill. Yellow powder—lupulinic-glands—separated from the strobiles of the hop—*Humulus Lupulus* (*Moraceæ*). Aromatic and bitter, and contains resin and volatile oil. In insomnia and for alcoholism. Inhalation 30 grains to a pint of warm water. Has been used in gastro-intestinal diseases—enteric and dysentery. Should be fresh. 5 to 15 grain doses. Stimulates the general and local circulation and improves the tone of the alimentary tract by its digestive properties.—**Tincture** (*B.P.* 1898). *Dose.*—½ to 1 drachm. Dried strobiles 1 in 5 alcohol (60%). More aromatic if made from fresh hops. **Smoking** the dried strobiles has a somniferous effect. **Liquid Extract.** *Dose.*—5 to 15 minims. An alcoholic extract, 1=1. **Solid Extract** by concentration. *Dose.*—2 to 6 grains.

Kent Hops contained 2·4% Tannin and 7·9% Ash, Choline, traces of a volatile alkaloid, *l*-Asparagine, Essential Oil and Resinous matter 14%, Potassium Nitrate and Sugar.—P.J. i./13,845.

Hop-growing industry. Kent had 16,260 acres, Sussex 2,420 acres under cultivation in 1925.—F. G. Hobart, P.J. ii./26,323.

Lycoperdon giganteum.—Puff Ball. Forms a soft and comfortable surgical dressing. The dusty powder is a powerful hæmostatic.

This and other fungi as styptics. History of and uses. Heating in an oven to render aseptic does not reduce its hæmostatic power. Troublesome bleeding

after tooth extraction can be stopped with it. It is not poisonous.—B.M.J. i./13,437.

Lycopodium.—The spores of the **Clubmoss** *Lycopodium clavatum* (*Lycopodiaceæ*). As a pill powder, also as a diluent for insufflations for the throat and ear, and as a dusting powder. **Tincture.** *Dose.*—15 minims to 1 drachm. Lycopodium first soaked in ether and dried 1, Alcohol (90%) 10. To stop frequent micturition, and irritation of the bladder. In our knowledge a case has received great benefit after Salol, Helmitol, Bismuth, etc., had been found useless. Use of in quantitative microscopy.—T. E. Wallis, B.P. Conf., 1919.

Maidis Stigmata. *Syn.* Corn Silk. The thread-like stigmata of nearly ripe maize fruit. Are demulcent and diuretic. Used in cystitis and nocturnal incontinence of urine. **Liquid Extract,** *Dose.*—1 drachm. Infuse corn silk 1,000 twice with water *q.s.* to cover. Evaporate liquor to 400. Cover and add cold water 300, allow to deposit, filter and evaporate to soft extract. Of this 1, with water 10, gives a clear solution. A *Syrup* may be made of Liquid Extract 1, Simple Syrup to 10. [℗] **Maidis Ustilago.**—Maize Ergot, Corn Ergot. Is used in parturition in place of ergot. *Dose.*—15 to 60 grains. [℗] **Fluid Extract,** ½ to 2 drachms.

Manaca.—A portion of the Brazilian root *Brunfelsia hopeana Benth.* (*Solanaceæ*) which has been used in rheumatic affections. Experiments have shown it to act on the glands, especially the kidneys. **Liquid Extract** 1=1. *Dose.*—10 to 30 minims thrice daily.—N.S.D. It is frequently combined with Salicylates as in the following. **Elixir Manaca** and **Salicylates ;** each ounce equals Manaca 80 grains, Sodium Salicylate 64 grains, Potassium Salicylate 32 grains, Lithium Salicylate 8 grains. *Dose.*—1 to 2 drachms.

Mandragora. Mandrake. *M. Autumnalis* (*Solanaceæ*).

The root is often forked and is sometimes similar to the human body in shape. It is poisonous with effects allied to belladonna. Conta ns an alkaloid. Much confusion exists over the name Mandrake. The Mandrake, as pharmacists understand the Museum specimens, is to be assoc ated with *M. officinarum* L. (this includes two varieties, *α vernalis, β autumnalis*='European' Mandrake). *English*, or false, 'Mandrake' is *Bryonia dioica. American* Mandrake is *Podophyllum peltatum.* The late E. M. Holmes assisted with these data in determining the type of 'Mandragora' to be used for whooping cough, as suggested by a French writer (H. Leclerc, Bull. Gen. Therap., 1925, 176, 78 per Y.B.P., 1925,182). The assumption is that *E. dioica* was really needed.

E. M. Holmes went into the matter of Mandragora in detail. He concludes 'if Mandrake is asked for by a *herb-using* customer he should be shown Podophyllum Peltatum. He is not likely to ask for Byrony Root under that name, and if Tinct. Mandrake is asked for a doctor's scrip should be required.'—P.J. i./30,127. See also *ibid.*, p. 72.

Manna, U.S. X. *Average dose.*—½ ounce. Saccharine exudation from *Fraxinus Ornus,* Linné (*Oleaceæ*), and other species. In flattish, somewhat three-edged pieces. Contains **Mannitol** (*syn.* Mannite, P. Ital., Ph. Ned. V.) (a non-fermentable sugar which does not reduce Fehling's Solution), $C_6H_8(OH)_6$ =182·1092, to extent of 74% and Dextrin about 20%. Has mild laxative properties. The author has suggested this sugar as an ingredient for an injection of Quinine ; *v.* 'Quinine-Mannitol.'

A report issued by an expedition of entomologists from the Hebrew University of Jerusalem states that Manna is not an exudation from the tamarisk tree, but is an excretion from the bodies of the coccid insects, the amount varying with the abundance or scarcity of the winter rains. According to the late E. M. Holmes this does not prove that the tamarisk Manna is the Manna of Scripture, wh ch occurs on plateaux in Central Africa, resembles coriander seed, is white in colour like hoar frost, sweet to taste, melts in the sun, and if kept overnight is full of worms in the morning.—C.D. ii./27,429.

Maranta. *Syn.* **Arrowroot Starch,** from *M. arundinacea* (*N.O. Marantaceæ*) is in some slight demand as an article of diet. 1 tablespoonful to the pint of hot water produces a demulcent mucilage. Florida Arrowroot from Zamia Floridana, A. De C. *N.O. Cycadaceæ.*—T. E. Wallis, C.D., 1923, p. 378. See also *Ipomœa Batatus.*

Marrubium.—Horehound. Dried leaves and flowering tops of *Marrubium Vulgare,* Linné (*Labiatæ*). *Average dose.*—30 grains. Given in lung affections —has tonic properties. Infusion 1 in 20 of boiling water.

Mastich (P. Belg.), yellow, brittle, resinous tears obtained from *Pistacia lentiscus* (*Anacardiaceæ*) : insoluble in water, but partly in Alcohol 90%

also soluble in Ether 2 in 1 and in Chloroform 2 in 1, also readily in Acetone. **Alcohol Mastichi**, R.D.H.—Mastich 2, Alcohol 90% 1; dissolve. Harvard Liquid is similar; this is employed for covering a cottonwood dressing so as to form a temporary dental covering, *e.g.*, during the treatment of canals with an antiseptic such as Formosyl. **Æther Copal** is R.D.H. (Copal Solution).—Copal 1, Ether 1, dissolve. For covering cement fillings to protect from the saliva. Zanzibar Copal is a fossilised resinous body obtained from *Trachylobium Hornoman nianum* (*Leguminosæ*); *Vateria indica* (*Dipterocarpeæ*), Indian; the Brazilian is from *Hymenæa* species and other plants. Australian Copal is Gum Kauri, *q.v.*

Microscopic Varnish. Mastich ½ ounce, Caoutchouc 15 grains, Chloroform 2 ounces; macerate and filter. Mastix is official in P. Belg.

Ph. Form. supplies an account of the use of this and other Resins in the manufacture of varnishes, polishes, lacquers, stains, etc.

Benzo Mastiche. *Syn.* ✱**Mastisol** (T.M. 524195).—A solution of Mastich in Benzol (with other ingredients) for wounds and general surgical use.

It is stated to act as a harmless disinfectant by arresting the micro-organisms on the skin, etc., where applied—virtually entangling them. Its action is rapid and quite painless, excepting for a temporary burning sensation when first applied. There is no danger of eczema which has resulted with use of Iodine. The asepsis produced is absolute. ***Method of use.***—In wound treatment the temporary first aid bandage, if any is removed and even if blood-smeared, is painted straight away with a sufficient covering of the preparation, and then a dressing applied. Slight injuries may have a layer of sterile gauze first to draw off the wound secretion. Previous washing, disinfecting with soap, Alcohol, etc., is not required. Useful in burns and corrosions of the 2nd and 3rd degree, the whole area being painted over and covered with cotton wool.

Heusner's Glue. Resin (commercial) 50, Venice Turpentine 5, Methylated Spirit 50, Benzene 25. For applying extension in fractures.—C. Max Page, B.M.J. ii./17,290.

The following have also been suggested :—

(1) Dammar 250, Castor Oil or Linseed Oil 30, Benzol 700, Sodium Bicarbonate 50, Amyl Acetate a few drops.

(2) Colophony Resin 300, Venice Turpentine 20, Castor or Linseed Oil 10, Benzol 700, Sodium Bicarbonate 60, Amyl Acetate a few drops.—K. Dieterich, P.J. i./15,100. See also B.M.J. i./25,441, and Mencière's Solutions.

Spiritus Adhesivus Resinosus. P. Svec. X. Terebinthina (*i.e.*, Common Frankincense from *Pinus* var. esp. *P. pinaster*—Solander) 7·5, Colophony Resin 18·5 Alcohol (90%) 4.

Pistachia Lentiscus Oil (Mastich Leaf Oil) contains Pinene and probably other Terpenes. Has an odour resembling Rue and Savin Oils.

Melaleuca Viridiflora (*Myrtaceæ*).—Indigenous to New Caledonia.

✱**Gomenol** (T.M. 215925.) *Syn.* Essentia ex Niauli, F.E. VIII. A French proprietary, is stated to be a distilled essence of, with Sp. Gr. 0·921 given in rhinitis, laryngitis, and other diseases of the respiratory system. It is also used in a variety of conditions as a general antiseptic. For injection purposes (chest examination) dilutions in Olive Oil are used, in strength varying from 0·5 to 5%. *cf. Leucadol.*

Gomenol 5% in Olive Oil used to replace a pleural effusion, harmless and of value. Liquid Paraffin has been used in man—it remains unabsorbed for 14 months. Hard paraffin (M.pt. 39° C.) has been tried in rabbits.—F. G. Chandler and S. R. Gloyne, 'Tubercle,' Sept., 1927.

Oleothorax. Olive Oil or Liquid Paraffin, with 0·5 to 5% Gomenol (Olive Oil preferable). Not an alternative to Pneumothorax. Must never be attempted in a virgin pleural cavity. Disinfectant and compressing action on the lung. Chief indication in pyo-pneumothorax, when acute stage has subsided. 5 or 10 Cc. maximum initial injection, increased to 30—50 Cc. at next injection, and subsequent doses doubled or trebled according to response. Inject by Jubet blood transfusion syringe or a 30 Cc. syringe using short needle with 1 mm. bore. Warm the oil, and when treating effusions aspirate first.—H. M. Davies, L. ii./30,203.

Pates Pectorales au Gomenol are also made. In influenza, bronchitis and coryza and with Vaseline Oil as Ear Drops.—Ph. Notes.

Melissa Officinalis (*Labiatæ* 'Balm' was in U.S., 1890, Eau de Melisse des Carmes. *Syn.* Alcoolat de Mélisse composé, FR. Cx. German *Carmelit*

Geist. Spiritus Melissæ Compositus; digestive; twenty to twenty-five drops twice a day, is also used as an application in rheumatism, etc. For history, see Edn. XVIII, p. 842.

Mentha Piperita (*Labiatæ*) **Peppermint.**

OLEUM MENTHÆ PIPERITÆ is distilled from the fresh flowering plant, Sp. Gr., 0·900 to 0·920. Soluble 1 in 4 of 70% alcohol. Should contain at least 50% menthol, free and combined, and not less than 5% of esters. **Spiritus.** (*B.P.* '14.) 1 in 10 alcohol 90%.

In coryza the use of this oil instead of menthol is advised. Warm a few drops and inhale. It removes headache from pressure in the frontal sinuses.

It has been confirmed radioscopically that Peppermint, and in a lesser degree Fennel and Chamomile, has a sedative effect on the stomach and a mild stimulating effect on the intestines.—P.J. ii./26,680.

Oil of Peppermint increases bile secretion; Oil of Thyme does not. A 50% solution of camphor in Ethereal oils produces paralysis of the bile ducts for a long time; a 20% solution in Oil of Peppermint produces paralysis for a short time, followed by polycholia.—Per Jl. A.M.A. ii./25,711.

Catgut is sterilised with the oil, see p. 533.

Possibility of production of sufficient Peppermint Oil to meet all requirements within the Empire. Cultivation experiments going on in Cyprus, Tanganyika, Africa and Burma.—Imp. Inst. Rept., 1930.

Menthæ Viridis Oleum, is distilled from fresh flowering Spearmint.

Forms a clear solution with an equal vol. of 85% alcohol, the solution becoming turbid on further dilution. (The turbidity is noticeable with a double volume of alcohol.—W.H.M.) Soluble 1 in 3 of 90% alcohol.—*B.P.* '14.

Menyanthes trifoliata. *Syn.* Trifolia Fibrina.—Bogbean Leaves or Buckbean. Are bitter tonic, emmenagogue, antiscorbutic, vermifuge and febrifuge: large doses are purgative and emetic; contain Menyanthin, a glucoside. Infusion 1 in 20. *Dose.*—2 to 6 ounces, taken hot, early in the morning daily, useful for functional amenorrhœa. Liquid Extract with Liquorice, 1 in 2. *Dose.*—½ ounce. The leaves are in P. Dan.

Mesembryanthemum var., *N.O. Aizoaceæ.* A specimen submitted to us from South Africa (1927) showed the presence of a minute quantity of alkaloid, with Mayer's Reagent, and a small amount of Tannin. Glucosides absent. A preparation of the plant has a local reputation in phthisis. A tincture 1 in 10 of the dried plant in Alcohol 60% was prepared. *Mesembryanthemum crystallinum* is the well-known ice-plant of the gardens.

Methyl Chloridum, $CH_3Cl = 50{\cdot}4804$. This gas made by distillation of Methyl Alcohol, Sodium Chloride and Sulphuric Acid is supplied compressed in cylinders. As local anæsthetic it is valuable in neuralgia, sciatica, rheumatism. Spray the part for 5 or 6 seconds only. If effect too strong, apply Glycerin.

Intoxication occurring among workmen at refrigerating works employing Commercial Methyl Chloride. A toxic agent, cumulative in action and detected in urine as Ammonium Formate.—H. M. Baker, Jl. A.M.A. i./27,1138. See also T. M. Legge and H. B. Porteous, B.M.J. i./30,414,751.

Methylene Chloride. $CH_2Cl_2 = 84{\cdot}9306$. Used as anæsthetic in Germany, under the name of 'Solaesthin.' Unsuitable for complete narcosis, but may be used to relieve the pains of labour by a process of intermittent administration.—Pres., Sept., '23,319. See also B.M.J.E. i./25,18.

Mezereum. *Dose.*—8 grains. Dried bark of *Daphne Mezereum* (*Thymelaceæ*) and other species. Contains a crystallisable substance (Daphnetin), which is isomeric with Æsculin (*q.v.*). Has been used as an epispastic for many years, and stimulant.

Mollinum. *Syn.* **Salve Soap-Unna.** Prepared by boiling Lard 400 with Caustic Potash 56 in Water 400 and Alcohol 90% 40. Allow to stand 12 hours at 50—60° C., then add Glycerin 150. A white soap, containing about 12% excess of fat. As a basis for ointments for rapid absorption. It is readily washed off with water, with which it forms a lather. It leaves the skin fresh and supple, and makes no grease spots on linen. **Mollinum Hydrargyri** and **Mollinum Potassii Iodidi** contain 33% and 10% respectively of mercury and potassium iodide. Not incompatible with mercuric chloride. Is used with respectively 3 to 5% of phenol and salicylic acid and thymol, and with birch tar 10 to 20% for psoriasis; with 30 to 50% of sulphur or 10% of storax for acne and scabies—with 5% of chrysarobin or naphthol; and with 10% of ichthyol, resorcin, iodoform, naphthalene or Ⓟ white precipitate.

Monsonia ovata. A Cape Geranium. Is closely related to and used in same manner as Geranium Maculatum.—N.S.D. A South African plan used as a native remedy for dysentery. Tincture, 1 in 8, Alcohol (90%) *Dose.*—1 to 4 drachms every 3 or 4 hours. Liquid Extract 1=1. *Dose.*—10 to 30 minims. In dysentery with excellent result. Must be used fearlessly as to dose. Effectual in 3 days where Ipecac. and Bismuth fail.—R. A. J. Asbury, L. ii./15,1318. **Monsonia biflora.** As prophylactic to hæmorrhage in enteric fever at the seventeenth or eighteenth day, contains an active principle *entericin*—neither alkaloidal nor glucosidal. *Dose.*—½ to 4 drachms every 4 to 6 hours.

Mori Succus.—Mulberry Juice. *Dose.*—1 drachm. The juice of the fruit of *Morus nigra* (*Moraceæ*). Mild laxative. Used in the form of **Syrupus Mori.** Mulberry Juice 20, heat to boiling point and filter. Dissolve sugar 36 in filtrate and add Alcohol 90% 2½ to the liquid.

Moschus (*B.P.* 1898). Musk. *Dose.*—5 to 10 grains. The dried secretion Grain Musk from the preputial follicles of the musk deer, *Moschus Moschiferus* (*Ungulata*). A useful nerve stimulant in cases of exhaustion in fevers and blood poisoning. Of value both for nervous excitement or nervous collapse. Is effective in obstinate hiccough and infantile convulsions. **Mistura Moschi.**—Musk 5 grains, Gum Acacia 5 grains, Syrup of Orange 1 drachm, Rose Water to 1 ounce. **Tincture,** 1 in 20 Alcohol 50%. *Dose.*—1 drachm. A Tincture of Artificial Musk has been used in whooping cough. In cardiac failure of acute pneumonia it has been given with camphor in pill. We have known 10 grain cachets to be successful in pneumonia.

A powerful heart stimulant. 1 grain with 1 grain of quinine in a pill every four hours. Worth trying in influenza.—A. Ransome, B.M.J. i./19,307.

The odour of Musk is due to muskone $C_{15}H_{28}O$ or $C_{16}H_{30}O$.

The butyl derivatives of many aromatic nitro-hydrocarbons are sold as **Artificial Musk.** Musk Baur is trinitro-meta-butyl toluene $C_6HCH_3(NO$ $C(CH_3)_3$.

Musk, Civet and Castor. Notes on the chemistry of these aromatic anim secretions.—C.D. i./30,288.

Muira-Puama.—This drug, which comes from Brazil, has been described as belonging to *Liriosma Ovata.* Miers (fam. *Olacaceæ*). It is said to contain an alkaloidal crystalline substance (we could not confirm this), an amorphous bitter substance, a little fat, and two kinds of resinous acids. Brazilian drugs vary however. It has an irritating action, also tonic aphrodisiacal properties. Used in nervous disorders.

Pilula Potentin Composita.—*Martindale*, contains Muira Puama Extract 1 grain with Ovolecithin 1 grain. A useful nerve stimulant and aphrodisiac. *Dose.*—3 to 6 per diem before meals.

Myricin. *Dose.*—2 to 5 grains. The powdered extract of *Myrica Cerifera.* An astringent and stimulant, and in large doses, emetic. For diarrhœa and jaundice.

Myristica, Nutmeg (*B.P.* '14). *Dose.*—5 to 15 grains. Dried seed of *Myristica fragrans* (*Myristicaceæ*) with testa removed. Aromatic and carminative. Contains **Nutmeg Oil.** *Syn.* **Oleum Nucis Moschatæ.** *Dose.*—½ to 3 minims. Colourless or yellow with Sp. Gr. 0·870 to 0·925. Soluble in 3 volumes of 90% alcohol. Has properties representative of the seeds. The expressed or concrete oil of nutmeg of yellowish colour contains **Myristicin.** $C_{12}H_{14}O_3$=206·1092. It is occasionally employed as a gentle local stimulant. **Spirit of Nutmeg.** *Dose.*—5 to 20 minims. Poisoning by nutmeg—three cases.—B.M.J. i./09,1005. Although Oil of Nutmeg and Mace only cause fatal poisoning in a rabbit in doses of 10 to 12 Gm., and a single nutmeg is capable of producing serious effects in man, it should be remembered that Oil of Nutmeg is very variable, some containing hardly any myristicin. The narcotic property of Nutmeg is attributable to myristicin, and it appears from experiments on animals that this substance when associated with the other constituents of nutmeg is more readily absorbed than when in the pure state. Nutmeg does not appear to contain any other substance of physiological action on animals.

Linimentum Myristicæ L.H.—Oil of Nutmeg 1, Olive Oil 3.

Terpeneless Nutmeg Oil, 1 is about equivalent to 5 of the original Oil.

Ceratum Nucistæ. *Syn.* *Muskatbalsam.* **Stomachic Balm.** Yellow Wax 2

Arachis Oil 1, Oleum Myristicæ 6, melted together and strained and moulded into tablets—used for rubbing abdominal region in infants (Hager).

Myrrha (*B.P.* '14). *Dose.*—5 to 20 grains. Yellowish or reddish gum resin from *Commiphora Myrrha, Off.* (*Balsamodendron Myrrha, B.P.* '98), and other species. Soluble in water to the extent of about 50% (forms whitish emulsion on trituration with), the remainder being mostly soluble in alcohol 90%. It is soluble in alkalis, *e.g.*, Potassium Carbonate. A favourite constituent in mouth washes, *e.g.*, Tincture of Myrrh and Borax, 1 of each in Eau de Cologne 20. Nitric acid should give with genuine myrrh a transparent dirty yellow liquid. False myrrh may give a bright yellow solution and bdellium is not dissolved. **Tincture** (*B.P.* '14) 1 in 5 alcohol 90%. *Flavoring.*—Glyl or Syl Menthæ Piperitæ or Lavandulæ; Extractum Glycyrrhizæ Liquidum.

For description of the literature of Myrrh, *see* E. M. Holmes, P.J. ii./13,116.

Myrtillus (*Vaccinium Myrtillus*).—Bilberry or whortleberry, the Blueberry of Canada. An extract or jam has been employed with good results in dysentery, and has been painted on the tongue in stomatitis. It is said to be of great value in typhoid, rendering the intestine aseptic. Suppositories containing 1 Gm. of the extract, and a liquid extract 1=2 of bilberry are prepared. An enema is also used. *Dose.*—2 ounces p.d. The fruits are in P. Austr. In chronic colitis the preserved juice and the liquid extract of the berry are excellent.—G. W. Major. **Myrtol.**—A constituent of myrtle oil; has been recommended in putrid affections of lungs and air passages. Expectoration lessened, but no effect on bacilli. *Dose.*—5 to 15 minims on sugar. **Capsules** contain 2 and 5 minims.

Myrtillin prepared from Blueberry Leaves by extraction with Alcohol 6% and the protein removed by precipitation occurs as a yellowish white powder freely soluble in water. It has been given *per os* to build up tolerance when the blood and urine have been made normal with Insulin or diet, and although less prompt, powerful and certain than Insulin it deserves clinical trial.—F. M. Allen, L. ii./27,18. See also Pres., Feb., '28,62.

Overdosage with *Blueberry Leaf Extract* is without detectable effects and its use in diabetes is therefore without undesirable effects.—L. B. Shipinor, Jl. A.M.A. ii./29,950.

℗ **Narceina.**—$C_{23}H_{27}NO_3,3H_2O$=499·2654. *Dose.*—$\frac{1}{8}$ to 1 grain. An Opium Alkaloid soluble in alcohol, hardly in water. Hypnotic sedative of doubtful utility. ℗ **Narceine Hydrochloride** is in Ph. Ned. V. Action is similar to morphine, but is not largely used in medicine.

Nasturtium Officinale (*Cruciferæ*). *Syn.* **Watercress.** Held in considerable repute for supposed medicinal virtues, *e.g.*, in treatment of chlorosis of young girls, and in ulcers, for centuries past. Xenophon advised Persians to feed children on watercress to improve growth. Animal experiments confirmed improvement of growth. Striking improvement in general condition and in amelioration of chronic constipation in patients fed on watercress in Poor Law Institutions. Found to have retarding effect on growth of experimental cancer; suggested due to Vitamin content, but more probably some other factor.

A glucoside, in the form of a Potassium salt, found present in plant. Also contains Vitamins A especially, also B and C and salts of Potash and Iron and considerable amount of Iodine.—S. Monckton Copeman, P.J. ii./25,386.

Succus Nasturtii Officinalis. *Dose.*—2 to 4 drachms.

The fresh juice of the plant, obtained by thoroughly pounding and pressing out with 1 of Chloroform added to 400 parts, or in hot weather 25% Spirit. Contains the bulk of the Chlorophyll of the leaf, also salts of Potassium, Iron and Iodine. See also an interesting experiment on the subject of preservation, p. 499.

Unguentum Nicotinæ.—1% in Adeps. Lanæ Anhydrosus.

℗ **Nicotina.** *Syn.* PYRIDYL-METHYL-PYRROLIDIN. $C_{10}H_{14}N_2$=162·1252. *Dose.*—$\frac{1}{6}$ to 1 grain. Agricultural and Horticultural Poison. See note under Arsenic. ℗ "*Tobacco and any preparations or admixtures (other than for smoking or snuff) containing the poisonous alkaloids of Tobacco.*"—*Added Mar., 1925, cf. Poisons Acts.* Colourless liquid (Sp. Gr. 1·011) volatile alkaloid (darkens in time) from Tobacco (*Nicotiana Tabacum*). The content may be from 0·5 to 5% combined as Malate or Citrate. *Manufacture.*—See Edn. XIX, p. 873. ***Uses.***—Has been used hypodermically for tetanus.—*Antidotes.*—Emetics, stomach-pump, Tannic Acid (small quantities repeatedly) stimulants.

The minimum fatal dose of Nicotine intravenously for etherised dogs is 5 mgm. per kilo.—J. E. Thomas and F. E. Franke, Jl. Pharm. & Exp. Therap., Oct. '28,134

A solution of Nicotine in water can be detoxified by exposure to Ultra-Violet Rays.—A. J. Pacini and H. McGuigan, Jl. Pharm. & Exp. Therap., June, '30,244.

POST ENCEPHALITIC PARKINSONISM treated by Nicotine. Cases which may benefit are those where voluntary muscular control is intact, but movement is hampered by excessive plastic tone. Nicotine base is used. Signs of intolerance are nausea, fainting, tachypnœ, and are watched for. Patient is kept in bed. Initial dose $\frac{1}{30}$ grain *ter die*. If no appreciable change in pulse chart, the dose was increased to $\frac{1}{10}$ or $\frac{1}{5}$ grain *ter die*. Immediate results indisputable. —H. Moll, B.M.J. i./26,1079.

℞ Infusum Tabaci 1 in 20 has been ordered as an ingredient in a hair lotion thus.—B.C.D. i./15,363.

References to Tobacco.—Toleration to Nicotine. Normal animal tissues have the power to destroy a small quantity of the alkaloid. There is evidence to show that the destruction of the Nicotine is brought about by ferment action.—W. E. Dixon. Somewhat similar toleration is that of Alcohol and Morphine.

Perfusion of the heart with Nicotine, animal experiments.—L. ii./17,759.

Nicotine nearly equals adrenalin in power of raising blood pressure. Tobacco must be barred where raised high tension indicative of danger. The influence of Tobacco as cause of arteriosclerosis. *cf.* p. 574.

The *Lancet* Laboratory conducted an enquiry into the toxic factor in Tobacco. Pipe mixtures contained the largest amount of Nicotine (2·04 to 2·85%), Egyptian, Turkish and Virginian cigarettes came next with 1·38 to 1·8%. A British cigar contained less (1·24%) and a Havana cigar least of all (0·64%) The cigarette (from any tobacco) yields least of its Nicotine to the *smoke*, while the pipe yields a very large proportion (70 to 80% in some cases) of its Nicotine to the smoke reaching the mouth of the consumer. Cigarette smoke contains, however, Furfural (a harmful substance) especially the cheap Virginian cigarettes—this is practically absent in the smoke both of the cigar and pipe. Further the cigar, pipe and Egyptian and Turkish cigarettes all yield Ammonia, which is an antidote to Furfural and Aldehydes generally. The cheap Virginian cigarettes contain very little Ammonia.

Tobacco 100 Gm., as cigarettes, yield when burnt in conditions approximating those which occur in smoking: HCN 0·08 Gm., Pyridine 0·146 Gm., Nicotine 1·165 Gm., NH_3 0·36 Gm., ***Carbon Monoxide*** 410 Cc. (No CO is produced in *Opium smoking.*)

Ordinary Virginian tobacco, from which cigarettes are made, contains weight for weight nearly twice as much Nicotine as Manila cigar tobacco, but when burnt during smoking the smoke from the cigar contains more than twice the amount of Nicotine as that from the cigarette.

Generally speaking, most of the Nicotine in smoking is destroyed during combustion. Carbon Monoxide poisoning liable to occur from cigarettes in excess. All the symptoms are in evidence in the man who smokes 20 cigarettes a day.—Prof. Dixon, B.M.J. ii./21,819; L. ii./21,1071.

Carbon Monoxide in tobacco smoke. The amount varies according to rate of smoking. In general, a normal sample of cigarette smoke will contain between 0·5 and 1% of CO. A cubic foot of straight coal gas contains as much CO as 4 cigars. CO may apparently replace oxygen in the blood without serious harm.—Prof. H. E. Armstrong, B.M.J. i./22,992.

Anti-cigarette League in Chicago made some exaggerated statements *re* Cigarettes.—L. ii./21,927. Increase of cigarette smoking.—B.M.J. i./30,709.

Chronic Nicotine poisoning from tobacco on the arteries, heart, eyes, etc. far worse than Opium and Cocaine evil—probably victims number 1,000 to 1 of the latter.—W. V. Furlong, B.M.J. i./22,862.

Tobacco (a well-known and popular cheap brand) dust, used as snuff, found to contain 0·66% of solid *Cannabis Indica*, caused poisoning symptoms.—R. L. E. Downer, B.M.J. ii./23,521, *ibid.*, 586,590.

Tobacco smoke is powerfully germicidal, containing *inter alia* Pyridine, a potent germicide. It rapidly destroys the cholera vibrio and the bacilli of pneumonia.

Nicotine is as toxic as Potassium Cyanide. A cigar weighing 6 Gm. and containing 5% Nicotine kills, if eaten. 100 cigarettes smoked in one day may cause death. About one-third of the nicotine contained appears in smoke, and much is left in the last part of the cigar. Moist tobacco is worst, no Nicotine being destroyed.—Per Jl. A.M.A. ii./25,314.

Average Nicotine content of ordinary Tobacco products in U.S.A. is 1·77%, and of "denicotinised" 1·28%.—Jl. A.M.A. ii./28,583.

Nicotine content of Tobaccos varies. Certain of them contain only $\frac{1}{3}$ to $\frac{1}{7}$ of the quantity present in a high Nicotine brand.—L. i./29,1313.

Denicotinised Tobacco. Analyses by the *Lancet* showed that the Nicotine, with one brand, has been reduced by 10 to 20%. Physicians are warned not to recommend denicotinised Tobaccos without further evidence than manufacturers' assurance, since in Germany some samples were found to have more than the normal content of Nicotine.—L. ii./25,32.

German view of Nicotine. German brands of so-called Nicotine-free cigars gave upwards of 420 and 320 mgr. per 100 Gm.—presumably in smoke. Nicotine deadly to adolescents.—Prof. Kionka, L. i./26,563.

Medical Aspects of Tobacco—a good historical summary. A 'drug of addiction' only in a humorous sense but hardly accurate. Psychological tests on medical students show that smoking lowers mental efficiency in 10 to 23%, especially in imagery, perception and association. Effects on the heart described. Effect on athletics doubtful. The irritating effect on the throat ascribed variously to Furfurol, Pyridine and Ammonia—not to Nicotine.—Sir H. Rolleston, L. i./26,961.

The Effects of Tobacco Smoking.

(*a*) On the digestive system.—Sir H. Rolleston; (*b*) From the nervous and mental aspect.—Sir R. Armstrong Jones; (*c*) The physiological effects.—Prof. W. E. Dixon, Pr., Jan., '27,1—28. See also W. E. Dixon on the habit.—B.M.J. ii./27,719.

128,000,000 lbs. of tobacco are consumed here every year. There is marked physical deterioration of the Dutch people. The consumption of tobacco in Holland per head has trebled in the last 50 years and is now eight times as great as that of the average European.—B.M.J. ii./26,265.

℗ **Nicotine Salicylate.** $C_{10}H_{14}N_2.C_6H_4OH.COOH = 300{\cdot}172$. White crystals freely soluble in water. 1% Ointment in skin affections useful.

℗ ✱ 'X.L. All' (T.M. 350770, cl. 3). Fumigator contains Nicotine 37·5%. *It is an Agricultural and Horticultural Poison. See note under Arsenic.* Has caused poisoning.—L. ii./06,1144.

According to Sollmann and Hanzlik's "Experimental Pharmacology" (1928), the poison produces a very complex mixture of effects, successive stimulation and paralysis of a variety of central and peripheral structures, and amongst these stimulation and paralysis of the receptive mechanism of striped muscle.

A Solution of one ounce of Nicotine in ten gallons of water is used as an insecticide for hop-spraying—500 gallons are used per acre. It is the best insecticide as it kills apple and plum aphides. It is also used as a sheep dip.—C.D. The addition of Saponins to Insecticide Emulsions is an advantage.

Ocymum Viride (*Labiatæ*). **Basil Plant** so called **Mosquito Plant**—was thought to have repelling effect on Mosquitoes. Others say that it neither repels nor attacks, in fact the mosquitoes just ignore its presence. The Oil from New Caledonia plant contained 18% Phenols, all Thymol (P.R., '24,43), while Oil from West Africa contained 32 and 52% Thymol, to which effect may be due.—P.R., '24,48.

Œnanthe Crocata (*Umbelliferæ*). Water dropwort—the most dangerous and virulently poisonous of all British native plants. It contains no alkaloid. Contains yellow essential oil with unpleasant odour and a viscid resin, nearly 3%, giving rise to convulsions by acting on the spinal medulla. The stem has poisoned children, being mistaken for Angelica. The roots resemble parsnip and are not unpleasant to the taste.

Œnanthe Fistulosa. *Syn.* **Hemlock dropwort.** Poisoning from, due to Coniine content.—L. i./31,1309.

Oleum Crotonis (*B.P.* '14). *Syn.* **Oleum Tiglii, U.S. X.** *Dose.*—$\frac{1}{2}$ to 1 minim. FR. CX. gives max. single dose 0·05 Gm. (=1 minim approx.). Max. during 24 hours 0·1 Gm. (=2 minims nearly). Expressed from seeds of *Croton Tiglium* (*Euphorbiacæ*). Sp. Gr. 0·940 to 0·960. *Soluble* in Ether

and in Olive Oil. A powerful skin irritant, will blister, and even cause suppuration and scarring. It has been found possible to immunise animals to the poisonous effects of Croton Oil by gradual increasing dosage of 'Crotin.' Has been employed for tinea. The Liniment well diluted may stimulate growth of hair on bald patches. Also used as a counter-irritant, but may produce powerful inflammation. In pneumonia of great benefit. Internally so violent a purgative that it is rarely given except to lunatics for obstinate constipation, and in cases of apoplexy (one or two drops placed on the back of the tongue). May be given as **Compound Castor Oil Capsules**, *q.v.* ***Antidotes.***—Olive Oil or milk as diluent. Opium to relieve pain and irritation.

Oleum Crotonis Compositum. Mix Blistering Liquid B.P. 6 drachms and Almond Oil 1 ounce. Allow Acetone to evaporate and add Croton Oil 40 minims. Used as a paint once a week in whooping cough—a success.—W. J. Midelton, B.M.J. i./23,746.

ABOR ARROW POISON is believed to be a paste made by pounding the soft parts of Croton Tigilium : refs., 17th Edn.

Croton Gubouga.—Has a reputation in the Eastern Transvaal as a remedy for malaria. The seeds and bark have been used. Prof. Greenish, P.J. ii./18, p. 289, found an acrid constituent.

Oleum Croton Elliottianus, TO BE CALLED 'OLEUM ELLIOTT' to distinguish from Croton Oil. *Dose.*—1 to 3 minims. *Capsules* are prepared containing ½ minim in each. *Dose.*—Two capsules at night for laxative effect. *It must be given in capsules*—three to five for purgative effect.

The oil of the seed of this East African plant has Sp. Gr. at 15° C. 0·9242 to 0·9246, Acid value 15·5 to 15·9, Saponification No. 188·5 to 189·4, Iodine Value 143·0 to 147·5. The yield of oil from the seed is about 30%.

Further on medicinal action, see J. Theodore Cash and W. J. Dilling Jl. Pharm. and Exp. Therap., Vol. VI, No. 2, Nov., 1914, and our Edn. XVIII, p. 847.

Oleum Graminis Citrati (*B.P.* '14). INDIAN OIL OF VERBENA or LEMON GRASS. Distilled Oil from entire herb. Carminative, with agreeable odour contains Citral, Citronellal, etc.—E.P.I. i./243.

Oleum Rhodii.—The source of 'Lignum Rhodii' of the older writers has never been accurately determined. One writer says the wood was brought from the Canary Islands, *e.g.*, the wood of *Convolvulus Scoparius* and *Convolvulus Floridus*. Another suggestion is that the wood used was *Genista Virgata* or *G.* (now *Cytisus*) *Canariensis*.—E. M. Holmes, P.R., Feb., 1911.

Oleum Rosæ. *Syn.* **Otto or Attar of Rose.** Distilled from the fresh flowers of *Rosa damascena* (3,000 yield 1). *For Characters and Tests, see Vol. II*

Rosettol.—An artificial Otto, probably more penetrating than the natural oil It is entirely free from Stearoptene, *i.e.*, is fluid at ordinary temperatures

Liquor Rosæ Dulcis.—Otto of Rose 8 drops, Carmine 2 drachms, Potash Solution ½ ounce, Alcohol 90% ½ ounce, Glycerin to 10 ounces. Ph. Form uses Syrup, but we find glycerin much better—no deposit. Useful for scenting and colouring pharmaceutical and toilet preparations. **Pulvis Rosæ Compositus.** *Dose.—Ad libitum.* Oil of Rose and Chloroform of each 1 (or combined 4 drops), Acacia 145 (grains), Sugar 840 (grains), Solution of Carmin 13 (drops). Useful to dilute powders such as Calomel, Grey Powder and Jalapin, also to colour and flavour mixtures—¼ or ½ ounce in 6 ounces. **Unguentum Aquæ Rosæ** (*B.P.* '14). *Syn.* CERATUM GALENI : UNGUENTUM GALENI COLD CREAM. White Beeswax 18, Almond Oil 61, Borax 1, Rose Water 20 Otto of Rose 0·1.—E. W. Lucas, B.M.J. ii./13,1013. *Ung. Aquæ Rosæ*, P.G has *Syn.* UNG. LENIENS ALB.

A suggested formula for *Cold Cream* :—Liquid Paraffin 61, Cera Alb. 18 Rose Water (undiluted) 20, Borax 1, Perfume *q.s.*—H. Stanley Redgrove P.J. i./30,427.

Oleum Sesami. *Syn.* **Benné Oil, Gingelli Oil, Teel Oil.** Expressed from *S. indicum* (*Pedaliaceæ*).

Saponification No. 189—193, and Iodine No. 103 to 114. Samples examined varied between 87 and 110. It has Sp. Gr. at 15° C. 0·920—0·924. Solidifying point 4° C. It does not readily turn rancid, is easily saponified even by cold process, is a semi-drying oil, neither gummy nor sticky, readily absorbed It is thinner than Cotton Seed Oil.

It may be used instead of Olive Oil in various parts of the Empire.—*B.P.* '14

Emulsio Olei Sesami. Sesame Oil 600 Gm., Water 300 Cc., Solution of Sodium

Hydrate (Sp. Gr. 1·33) 6 Cc. *Dose per diem.*—2 to 3 ounces. Used by Prof. Arloing in the treatment of diabetes.

Origanum Majorana (Sweet Marjoram) and **O. Vulgare** (French Codex, Common Marjoram) (*Labiatæ*) have been used medicinally. Value is attributed to the essential oil contained as an aromatic tonic.

A number of varieties of Origanum are distilled in various parts of S. Europe. Full data Edn. XVIII, p. 848. Carvacrol occurs to the extent of 80% in some, whilst Thymol preponderates in Thyme Oil. The latter in commerce is often called Origanum Oil.

As a remedy against ***hookworm infection, Carvacrol*** has been suggested in U.S.A. Its cost (made from Turpentine) would be low. It is liquid at body temperature, hence would come in close contact with the intestinal wall. Experiments showed it has about same toxicity as Thymol.—A. E. Livingston, Hyg. Lab. U.S. Pub. H. Serv. Abst., C.D., June 24, '22,817.

Originum Vulgaris.—Essential Oil from various parts of Italy. From Sicily the yield was 1·106% by distillation, and 2·88% by Acetone extraction. It contained 50% of Thymol.—Y.P.B., 1922,78.

Pastinaca Sativa, also known as Peucedanum Sativum, Wild Parsnip, rubbed on the skin caused blisters. Cured by solution of Tannic Acid.—E. Saville Peck. P.J. ii./30,219,239; see also Y.B.P., '20,173.

Pœonia Officinalis. The red peony of the gardens. The root has acid taste. The Greeks possibly used it as a wound-dressing.—Sir Chas. Ballance, L. i./20,5.

Pareira (*B.P.* 1898). *Average dose.*—30 grains. Dried root of *Chondrodendron tomentosum. Uses.*—Similar to those of Buchu. Employed in chronic inflammation of the genito-urinary tract. **Extractum Pareiræ Liquidum** (*B.P.* 1898). *Dose.*—½ to 2 drachms. Extract the Pareira Root with boiling water. Evaporate the liquor until it contains 33⅓% extractive matter. Add to 3 volumes of such, Alcohol 90% to produce 4.

Passiflora Cerulea. Tincture made by macerating the crushed flowering herb in an equal weight of 90% alcohol used in insomnia. *Dose.*—30 minims at bedtime. The leaves contain a notable proportion of Prussic Acid.—H. Leclerc, Bul. Gen. de Therap., P.J. ii./20,220.

Patchouli.—Genuine Patchouli is from Pogostemon Patchouli (Bell) *Labiatæ.* The yellow volatile oil is contained in the glands in the epidermal cells, in the hairs and in the central leaf tissue. The chief supplies of the leaf come from the Straits Settlements, and recently from the West Indies. Description of various Patchoulis of Commerce.—Java from Pogostemon Heyneanus, Khasia from Microtæna Cymosa, Chinese M. Robusta, etc. Contains Cadinene 40 to 45% and Patchouli Alcohol.—E. M. Holmes.

Pectin.—A complex carbohydrate contained in many fruits and vegetables. It has a sweetish, glutinous taste. It reduces Fehling's Solution before hydrolysis, *i.e.*, as such. When boiled with sugar in acid media it forms a jelly. Pectin is used extensively in the manufacture of jams and jellies. Pectin-Sugar-Acid Gels can be obtained with 0·125% Pectin, but jams usually contain 0·5 to 1%. For 1% Pectin the lower limit for sugar content is 50%, and the higher 75%. Less than 66% sugar grows moulds and yeasts. Gooseberry juice, apple and lemon, are used commercially as additions where the fruit is not rich, *e.g.*, strawberry, cherry, raspberry, blackberry, rhubarb.—S. Back, P.J. ii./31,44. A colourless solution of Pectin termed 'Certo' is sold for domestic jam-making and reduces time of boiling. The optimum acidity is *p*H 3·2—3·6.—P.J. ii./31,294. Pectin manufacture.—P.J. ii./29,388. Pectin, on treatment with alkali, yields pectic acid, methyl alcohol and acetone. The methyl alcohol found in rum is attributed to the decomposition of the pectin of the sugar cane, and the methyl alcohol and acetone present in cider are derived from the pectin of the apple juice.

Arhemapectyl.—A colloidal isotonic solution of Pectin for use in hæmorrhage. Is non-toxic by ingestion up to 80 Cc. 1% solution, and has no contraindications. Supplied in ampoules and ovules.

Pepo, U.S.—Ripe seed of *Cucurbita Pepo* (*Cucurbitaceæ*), Pumpkin. *Average dose.*—1 ounce. Said to be a good remedy for tapeworm, given before breakfast, followed by coffee and later a brisk cathartic.

Phaseolus Radiatus.—The fruits called by the Malays Katjany-idgo beans have been used in beri-beri. See Edn. XIX, p. 877.

Phlorhizin, $C_{21}H_{24}O_{10}2H_2O = 472{\cdot}2184$. *Syn.* PHLORIDZIN. A glucoside from various rosaceous trees, in pinkish-white crystals, sparingly soluble in

water, in alcohol 90% 1 in 4, and in ether, and induces artificial diabetes (glycosuria) in doses of at least 15 grains. The drug is a valuable mild tonic suitable for children; a substitute for quinine. *Dose.*—Tonic 5 grains, Antiperiodic 15 grains. Diminished Phloridzin glycosuria indicates disease of the kidney, and complete absence of sugar should be regarded as a sign of advanced renal disease.—L. i./07,717, see also *Vol. II.*

Phytolaccin. *Dose.*—1 to 5 grains. Extractive from *Phytolacca Decandra*, Poke Root (*Phytolaccaceæ*).—U.S. VIII. Has emetic, cathartic and alterative properties. Has been used in rheumatism and syphilitic affections. A tincture 1 in 10 alcohol 45%. *Dose.*—3 to 10 minims. **Fluidextract**, U.S. VIII., 1=1 by Diluted Alcohol. *Average dose.*—Emetic 15 minims; alterative 1½ minims. Locally for painful mammæ.

Pichi.—Leaves and twigs of *Fabiana imbricata*; useful in gravel and some kidney diseases. **Liquid Extract.** *Dose.*—10 to 60 minims. Has given good results in gonorrhœa and cystitis and complications.

Picrorhiza (*B.P.* '14). *Dose.*—10 to 60 grains. Dried rhizome of *P. kurroa.* (*Scrophulariaceæ*). Tonic, antiperiodic, aperient. This and Amphicome Emodi are called Kaur. Inferior to quinine.—I.D.C. **Extractum Liquidum.** *Dose.*—15 to 60 minims. 1 in 1 Alcohol 60%. **Tinctura.** *Dose.*—½ to 1 drachm. 1 in 4 Alcohol 45% (was 1 in 8).

℗ **Picrotoxinum** (*B.P.* 1898). $C_{45}H_{50}O_{19}=894{\cdot}39$.

Dose.—$\frac{1}{100}$ to $\frac{1}{35}$ grain. Fr. Cx. *Max. single dose.*—$\frac{1}{32}$ grain, max. during 24 hours $\frac{1}{10}$ grain approximately. A neutral crystalline principle obtained from the fruits of *Anamirta paniculata* (*N.O. Menispermaceæ*)—or Cocculus Indicus (growing on the Malabar Coast); does not form salts. Nearly entirely soluble 1 in 330 of water, and 1 in 13 of alcohol 90%, and about 1 in 500 of fats; its taste is bitter. The substance is thought to be a compound of Picrotoxinin with M.pt. 201° C. and Picrotin 249° C. The combined substance melts at about 200° C. Lævorotatory, $a=-29{\cdot}26$ at 16° C. (Absolute alcoholic solution of 4·1 Gm. in 100 Cc.).—Fr. Cx.

Gives good results in checking night-sweats (does not like Atropine cause dryness of the throat), also employed in epilepsy and chronic alcoholism: overdoses cause stupor, delirium and convulsions (by acting on the medulla) It increases the secretion of the mucous and perspiratory glands. Its action in checking night sweats is explained by Cushny as probably due to its increasing the respiration and thus preventing that stimulation of the nervous mechanism of perspiration which occurs through the partial asphyxia.

Antidotes.—Administer emetics, use the stomach tube, then give Chloral and Potassium Bromide, then stimulants.

℗ **Hypodermic Injection.**—1 in water 360. *Dose.*—3 to 6 minims.

℗ **Liquor.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250. Filter. *Dose per os.*—2 to 12 minims in water. Is palatable and keeps in solution at all temperatures.

℗ Pills of $\frac{1}{30}$, $\frac{1}{60}$, $\frac{1}{50}$, or $\frac{1}{100}$ grain form suitable doses for checking night-sweating of phthisis taken for 2 or 3 nights successively. The drug is slightly cumulative, may thus be temporarily stopped with effects persisting. A pill of Picrotoxin $\frac{1}{60}$ grain, Atropine $\frac{1}{120}$ grain with Agaricin $\frac{1}{12}$ grain, is said to act even better.

In addition to the body Picrotoxin which occurs in the seed only, the tasteless alkaloid Menispermine has been found in the pericarp of the fruit.

Structure of Cocculus Indicus. Sections of fruit and seed.—T. E. Wallis, P.J. i./21,306.

Pimento (Allspice). Dried full-grown unripe fruit of *Pimenta officinalis* (*Myrtaceæ*). From W. Indies. **Oleum Pimentæ.** *Dose.*—½ to 3 minims Sp. Gr. 1·030 to 1·055 O.R., 0° to—4°; R.I. 1,508 to 1,535; Soluble 1 in 3 of 70% alcohol. Eugenol content not less than 60% by volume.

Stomachic and antispasmodic.—Put into hollow teeth to relieve pain.

A snuff composed of Powdered Pimento with addition of 3 minims of Eucalyptus Oil to the ounce is advised for hay fever to promote a healthy discharge of pituitary mucus in which the pollen grains are killed and washed away. The allspice is a local stimulant and antiseptic.

Pimento Leaf Oil contains 89% Eugenol.

Pinus Canadensis.—The hemlock spruce of the U.S.A. *Syn.* Abies Canadensis. A fluid extract is used as an astringent in leucorrhœa; and given internally for diarrhœa, hæmoptysis, and night sweats. *Dose.*—10 to 60 minims, also a distilled colourless variety in commerce.

Pinus Strobus. White Pine of America—the Syrup of the bark in that country enters frequently into Cough Syrups.

Piperina. $C_{17}H_{19}O_3N = 285{\cdot}1562$. *Dose.*—1 to 10 grains. A crystalline principle from the fruits of *Piper nigrum* and *Piper longum* (*Piperaceæ*). Melts at 130° C. (266° F.). Insoluble in water, soluble in alcohol. It has febrifuge, stomachic and antiperiodic action. **Oleoresina Piperis.** *Average dose.*—½ grain. Is prepared by acetone extraction of pepper.

Piscidia Erythrina. Jamaica Dogwood (where it is used as fish poison) Extractum (Alcoholic) from the bark. *Dose.*—2 to 5 grains, and Liquid Extract 1=1. *Dose.*—20 to 120 minims. In neuralgia, toothache, bronchitis, pertussis, insomnia, and dysmenorrhœa.

Pistoia Gout Powder.—Several authorities give Bryony Root 2½ drachms, Gentian 2½ drachms, Chamomile 2½ drachms, Colchicum Root 5 drachms, Betony Root 10 drachms. Mix and divide into 365 powders. *Dose.*—1 to be taken each day of the year in a full glass of hot or cold water.—Ph. Form. Have also been advocated for rheumatism.

Platinum, Pt. = 195·2 Sp. Gr. 21·5. This metal is capable of being heated to very high temperature without melting. It resists all acids except Aqua Regia and is hence used to make analytical apparatus. **Platinic Chloride** $PtCl_4 2HCl + 6H_2O = 518{\cdot}0512$. Precipitates Ammonium and Potassium from Solutions. Solution of Platinic Chloride (*B.P.*'14) is 5% in water. Has been given in syphilis in ⅛ to ½ grain doses. **Potassium Chloroplatinite** K_2PtCl_4. Crystals soluble in water. Used in photography in acid toning baths. **Potassium Chloroplatinate** K_2PtCl_6 is almost insoluble. It is the compound resulting in Potash Estimations.

Rhotanium. An alloy of the rare metals with properties similar to those of Platinum. Used for making crucibles, dishes and the like, for analytical laboratory purposes.

Polygonum Hydro-piper L. (*Polygonaceæ*) WATER PEPPER. Has been used for dropsy and the allied *P. Aviculare* for difficulty in passing urine—both have some action on the kidneys.

Populin.—Benzoyl-Salicin. From *Populus tremuloides* (*Salicaceæ*). *Dose.*—1 to 4 grains. Has antipyretic properties.

Primula Obconica causes acute dermatitis in susceptible persons.—A. J. Hall.—L. i./21,427. Dermatitis venenata produced artificially by rubbing Primula Obconica leaves into the scarified skin.—R. Cranston Low, B.M.J./ ii./21,559. See also A. Whitfield, L. ii./21,61.

Pruni Virginianæ Cortex. *Syn.* WILD CHERRY BARK.

The bark of *Prunus serotina* (*Rosaceæ*) contains amygdalin. It possesses bitter tonic properties, with more or less sedative ones. The preparations in use—the tincture and syrup—are used to palliate the cough in phthisis, pertussis and bronchitis, in palpitation of the heart, and debility of the digestive organs. The Syrup is also a useful flavouring agent.

Ⓟ**Tincture** (*B.P.* '14). *Dose.*—30 to 60 minims. Virginian Prune Bark, approx. 1 in 5. 10% Glycerin approx. used as an addition. Ⓟ**Syrup** (*B.P.*'14). *Dose.*—½ to 1 drachm. Virginian Prune Bark, 15%.

Ⓟ**Syrupus Benzaldehydi Hydrocyanicus.**

Dose.—½ to 1 drachm. Saturate Distilled Water 10½ with Benzaldehyde, dissolve Sugar 15 in the liquid, and add 0·01 per cent. of Hydrocyanic acid.—Rutherford Hill.

Psoralia corylifolia (N.O. *Leguminosæ*). The seeds are in use in India as remedy for skin diseases. The oil of this species is advocated for use in leucoderma (white leprosy).—J. C. Ghosh, P.J. ii./28,54.

Psyllii Semina.—The small dark brown seeds of *P. pulicaria* from S. Europe. The best variety is said to be *Plantago Psyllium L.* or Fleawort, known locally as 'clanny plaintain.'—H. B. Figg, P.J. i./31,29. The testa contains a large amount of mucilage. A **Mucilage** or **Decoction,** 1½% is employed in France as a demulcent drink similarly to the Ispaghula preparation in India. The seeds are used for correcting constipation like Agar Agar and Linseed.

Minro-Psyll Compound.—A Canadian preparation consisting of a 50% emulsion of Mineral Oil in Psyllium Jelly, with 2 grains Phenolphthalein per ounce. *Dose.*—2 to 4 drachms (8 to 16 Cc.), diluted with water if preferred, night and morning, for constipation.

Pterocarpi Lignum. Red Sander's Wood. *Syn.* Santalum Rubrum U.S. X. Heart-wood of *Pterocarpus santalinus* (*Leguminosæ*). Contains santalin, and is used as a colouring agent in compound tincture of lavender.

Pulegium. Pennyroyal (*Labiatæ*). Oleum Pulegii, Oil of Pennyroyal. *Dose.*—1 to 3 minims. Sp. Gr. 0·927 to 0·962. Rotation + 13° to + 35°.

It comes from Spain, S. France and Algeria, and contains 80% Pulegone.—Encourages menstruation—administered in form of a hot tea at bedtime. Is reputed to produce abort on. This is distinct from the oil passing under that name in U.S. VIII., *i.e.*, **Oleum Hedeomæ** from *Hedeoma Pulegioides* (*Labiatæ*) indigenous in N. America, which has similar properties. It is similar in composition.—*ibid.*

Poisoning by Essence of Pennyroyal—4 drachms taken—caused delirium and Camphor taste in the mouth. Hot tea given produced profuse vomiting. As a general treatment give an emetic and avoid Alcohol.

Pulque is the fermented sap of *Agave Americana* and *A. Mexicana* (*Amaryllidaceæ*). See Edn. XIX., p. 879.

Aguamiel Ph. Mex. V. is from the stem of *Agave salmiana*, in which inflorescence has been prevented by cutting off the flowering parts. Popularly used locally as an antiscorbutic and in the treatment of gonorrhœa.

Pulsatilla.—*Anemone Pulsatilla* (*Ranunculaceæ*). *Syn.* **Pasque Flower.** The entire herb is used. Contains Anemonin, a crystalline substance. **Liquid Extract.**—1=1. *Dose.*—2 to 5 minims. Tincture 1 in 10, Alcohol 60%. *Dose.*—5 to 30 minims. In dysmenorrhœa and amenorrhœa.

Dysmenorrhœa relieved by Pulsatilla. Not used in cases where the amount is excessive, lasting six days or more. Most patients were unmarried. The mixture given was Tinct. Pulsatilla 4 drachms, Spt. Chlorof. 2 drachms, Chloroform water to 6 ozs. 2 drachms to be taken as soon as menstrual (or premenstrual) pain begins and every three hours while pain continues.—F. C. Coley, B.M.J. i./22,13. *See also* '*Pulsa.*'

Pyrethri Flores.—The dry flowers of *Pyrethrum roseum* and *P. carneum* in powder as a dust ng powder to keep off insects. Those from Dalmatia are from *Pyrethrum* (*Syn. Chrysanthemum*) *cinerariæfolium* (*Compositæ*). A Tincture, 1 in 4 Alcohol 60%, is used as an insecticide lotion. Encouraging results from the use of a new Pyrethrine obtained from *cinerariæfolium* as an anthelmintic. *Ascaris lumbricoides* of the pig and tænias of the dog died when placed in a 'dilute' solution. Excellent results said to have been obtained in human beings infected by various worms and by *giardia*. It is being tried on the hookworm in Egypt.—J. Chevalier, Bull. Acad. Med., '28,446, per L. ii./28,457.

The powdered drug may be puffed from bellows into the room to kill mosquitoes.

Dalmatian Insect Flower prefers sunny, pebbly, calcareous hill-sides, dry and without irrigation, and a fairly dry atmosphere. The seed in commerce is apparently dried by heat to prevent germination. Details of culture.—E. M. Holmes, P.J. i./17,7.

Pyrethrum can be grown in this country. Samples agreed with those from Dalmatia. The stalk contains little of the toxic principle. No difference between closed and open flowers. Petroleum Extract with Rape Oil kills aphis.—F. Tutin, P.J. ii./30,388. Pyrethrum cultivation in England possible. Kerosene extracts of the flowers widely sold as fly sprays.—J. C. F. Fryer and C. T. Gimingham, Plant Path. Lab., Min. Agricult., per B.M.J. i./31,718. Insect Flowers now extensively cultivated in Kenya.—Imp. Inst. Rept. 1930. Extract of Pyrethrum Flowers *alone* is of very little use for fly prevention, *Acetone* is a good solvent.—C. E. Sage. Notes on chemistry and some commercial products.—C.D., Feb. i./30,130.

✱**Shelltox** (T.M. 501877, 501878, 502687, 502686, Cl. 2). An efficient liquid insecticide. Harmless to human beings. Employed by means of a sprayer. ✱**Rex**" (T.M. 471583, Cl. 2) is also a good fly-killer.

✱**Pysect** (T.M. 500486, Cl. 2). A concentrated liquid extract of Pyrethrum flowers biologically tested. 1 ounce to 1 gallon makes a wash for insect pests in the garden. 'Double Strength' is also made, and a 'Concentrate' for large scale users.

Pyrethri Radix.—Pellitory Root (*B.P.*'14), Fr. Cx. *Average dose.*—30 grains. Dried root of *Anacyclus Pyrethrum* (*Compositæ*). A useful sialogogue, causing considerable salivary effusion; is used in the form of Tincture 1 in 5, which might be made with 60% alcohol. Must be given with caution to children, as it is powerful in effect. **Glycogelatin Pastils** are made containing 1 grain of the powder for dryness of the mouth. To promote a continuous flow of saliva a nd thus irrigate the ducts and so prevent ascending infection.

Tinctura Pyrethri Composita. Tincture of Pyrethrum (Root) 2, Clove Oil 1, Camphorated Chloroform 1. As tooth-ache drops.—C.D., Oct., '21,16.

Pyridina. Fr. Cx. C_5H_5N = 79·047. *Dose.*—5 to 10 minims daily increased. A colourless alkaline liquid, Sp. Gr. 0·980, with persistent odour, miscible with water and alcohol, boils at 243° F.; obtained from many organic substances by dry distillation; is contained in and combined with nicotine in tobacco smoke. It is probably the relieving agent of various cigarettes and powders smoked or burnt for asthma and whooping cough. A drachm of it is placed on a plate in a small room in which the patient remains from 20 to 30 minutes three times a day. Is employed for making Denaturalised Alcohol.—*See* Alcohol. It is stated to be less toxic than nicotine.

✱ **Uroselectan B** (T.M. 486502,513201). *Syn.* 'D.40.'

A pyridine derivative containing 51·5% of Iodine used in pyelography. Ampoules contain 15 Gm. in 10% Invert Sugar solution.

Dose.—20 Cc. intravenously (less for children) warmed to 100° F. Stated to be well tolerated.

For anatomical information only, a single pyelogram 20–30 minutes after the injection suffices, but for urological purposes exposures are made at 10, 30, and 50 minutes. Before the second and third exposure the bladder should be emptied. When renal function is normal the best films are often obtained in 2 to 5 minutes after injection; with function abnormal the best results may not be obtained for 6–24 hours, and if function is completely suspended it is impossible to obtain a pyelogram.

To be used with caution in patients with severely impaired liver function or acute or chronic uræmia, and where the urinary disease is accompanied by severe general disease.

Uroselectan B, in excretion urography. Non-toxic and rapidly eliminated in a concentrated form. Small dose.—Prof. v. Lichtenberg, B.M.J. i./31,625, 633.

Recent advances in diagnostic methods in renal affections. Technique of injection of Uroselectan B and Abrodil.—R. Ogier Ward, B.M.J. ii./31,175; Roy. Soc. Med. Discussion.—L. i./31,757,767.

The substance was preceded by **Uroselectan,** *Syn.* Iopax, without the suffix 'B.' The following are references to the earlier solution, which was employed in strength of 40 Gm. in 100 Cc. warm water intravenously.

Excretion bears a direct relationship to renal function.—E. J. H. Roth and H. W. S. Wright, B.M.J. i./30,778. Photos taken at ½, 1, and 2 hours. If renal function normal, a shadow of the whole excretory urinary tract obtained in ½ hour; if subnormal, it is less dense and delayed. Of value in elucidating pathology of kidney disease, especially hydronephrosis.—K. Heritage and R. Ogier Ward, B.M.J. i./30,734.

180 Gm. can be given intravenously in a man of 60 kilos, but clinically, 40 Gm. is used as stated. Cannot be given *per os.* Should not be given when both kidneys are damaged.—Frank Kidd, L. ii./30, 128; see also K. Heritage, *ibid,* 132.

In the presence of ureteric obstruction a clear ureterogram may be got. Useful in severe cystitis where catheterisation is difficult; in profuse hæmaturia, urethral stricture and enlarged prostate, and in the subsequent examination of a kidney the ureters of which have been transplanted. No shadow, or only a poor one, may be seen in pathological renal conditions.—R. V. Cooke, L. ii./30,686.

Quassia (*B.P.* '14).—Jamaica Quassia. Wood of *Picræna,* or *Picrasma excelsa* (*Simarubaceæ*). Contains picrasmin. Infusion 1 in 100. Chiefly employed as a bitter tonic. *Flavoring.*—Syl Vanillæ, Syl Rosæ; Syrupus Zingiberis. **Liquor Quassiæ Concentratus** 1 in 10. **Tincture** 1 in 10. Alcohol 45%. By rectal injection the daily use of a strong infusion will get rid of tapeworms and threadworms. *Surinam Quassia* (not now in use) is the wood of *Q. amara* (U.S.), a branching shrub, whereas *P. excelsa* is about 100 feet high. **Extractum Quassiæ,** U.S. VIII., aqueous extract made up with milk sugar. (Powder form 1 = 10 of drug.) Quassia is free from tannin, hence compatible with iron preparations as tonic.

℗ **Lotio Quassiæ.** Concentrated Quassia Infusion 1 ounce, Spirit of Rosemary 1½ drachms, Sassafras Oil 30 minims, Alcohol 2 drachms, Liquefied Carbolic Acid 2 drachms, Water to 6 ounces. Shake before use. For nits in children's hair. The wood contains **Quassin,** $C_{10}H_{12}O_3$ (?)=180·1436, which forms lamellar crystals, soluble about 1 in 400 of water, soluble also in acid and

caustic alkaline solutions. Increases secretion of salivary glands and kidneys, and stimulates digestion. *Dose.*—$\frac{1}{30}$ to $\frac{1}{3}$ grain.

Quassia Suppositories containing $\frac{1}{4}$ grain Extract with gelatin basis (15 minim size) are prepared. These have been found valuable for removal of thread worms in young children. Infantile fits in hospital practice are often due to worms. These suppositories are simple and convenient to use in comparison with Enemata. The strength may be increased.

Quassin, FR. CX. has formula $C_{32}H_{12}O_{10}$=586·3276. *Max. single dose.*—$\frac{1}{10}$ grain. F.E. VIII. average dose $\frac{1}{16}$ grain; p.d. $\frac{1}{6}$ grain. Surinam Quassia differs slightly from Jamaica Quassia. Thread-worms have been discharged on the third day by 2 grain Quassia Extract Pills (Keratin coated)—one morning, noon and night. Previously 2 ounces of compound decoction of Aloes.

Anti-smoking Gum.—Quassia made up in form of a chewing gum—a substitute for smoking for the use of patients suffering from tobacco amblyopia who feel the loss of their tobacco. Finely ground Quassia 1 in gum mass 12 is not too strong for excessive smokers, particularly if there be an alcoholic complication. Where this is absent 1 in 20 is strong enough. It creates appetite.

Quebracho (*Aspidosperma Quebracho*) Bark from Argentina contains Ⓟ Aspidospermine. Tonic, febrifuge and antispasmodic. Ⓟ Tincture of Quebracho 1 in 5 alcohol 60%. *Dose.*—1 drachm. Ⓟ Liq. extract 1=1. *Dose.*—10 minims.

Quebracho Bark is subject to considerable variation. Examination of a sample submitted.—G. R. A. Short, P.J. i./26,103.

Red Quebracho Bark recognised as distinct in the Index Kewensis. Contains distinct colouring matter in the heart-wood. Physiological examination needed. Used in making Tannin Extract.—E. M. Holmes, P.J. i./26,4; ii./29, 194.

Quercus Suber, the Cork oak, flourishes in the Maritime Alps. In the Cork industry, bark of trees over 2 ft. in circumference (about 10 years old) is used.—P.J. i./30,77.

Quillaia saponaria (*Rosaceæ*). (*B.P.* '14). *Syn.* Panama Bark (Soap Bark). Contains quillaic acid, $C_{19}H_{30}O_{10}$=418·329 and sapotoxin, $C_{17}H_{28}O_{10}$ =408·2184, closely allied to saponin. Has a sweetish but acrid after-taste and possesses emulsifying properties, causing frothing in water in which it has been macerated. Its lather kills pediculi of scalp. Soap-bark has been used as an expectorant in bronchitis, contra-indicated in inflammation of the intestines or stomach, or ulcerated condition of the mucous membrane. Is used for emulsifying tar preparations. Tincture (*B.P.* '14), 1 in 20 of Alcohol (60%). Five minims of this will emulsify 1 drachm of fixed oil. Fluid extract, U.S. VIII. 1=1. *Average dose.*—3 minims. The powder has very marked sternutatory properties. Acne Lotion—Decoction of Quillaia 4 ounces, Eau de Paris 60 minims. Ammonia Solution 40 minims. Use night and morning. It has poisonous properties.

Examination of Quillaia Bark and Commercial Saponins. The Sapogenin assay method is best.—J. Cofman-Nicoresti & S. B. Tallantyre, B.P. Conf., 1920.

Ranunculus Ficaria (N.O. *Ranunculaceæ.*) *Syn.* PILEWORT or *Lesser* CELANDINE. An ointment is prepared by digesting the fresh Pilewort with melted lard 24 hours. Suppositories are made containing 72 grains of the ointment and 18 grains of Spermaceti; also, more convenient, a smaller size, containing 45 grains of the ointment and 15 grains of Spermaceti; have been employed in hæmorrhoids. Historical notes *vide* L. i./17,42.

Resina (*B.P.* '14).—From the crude oleo-resin of various Pines after distilling Oil of Turpentine. Yellow resin soluble in Alcohol 90%, Ether and Benzol. Unguentum Resinæ contains Resin, Yellow Beeswax, Lard and Olive Oil. Ceratum Resinæ U.S. X. Resin 7, Yellow Wax 3, Lard 10. (CERATUM, U.S. White Wax 3, Benzoated Lard 7.)

Rhei Rhizoma (Radix).—*Dose.*—3 to 10 grains repeated. *Single dose.*—15 to 30 grains. *Rheum officinale* and other species (and the variety *R. Palmatum*, U.S. X.) (*Polygonaceæ*) grown in China and Thibet, partially decorticated and dried. Todaiwo P. Jap. IV. is Chinese Rhubarb. *For Constituents see Vol. II. Flavoring.*—Syl Vanillæ, Glyl Pini. Laxative and stomachic; often given with Sodium Bicarbonate, especially to children. Extract made with 60% Alcohol. *Dose.*—2 to 8 grains. Fluid Extract 1=1 made with Alcohol 75% approx. *Dose.*—15 minims. Pilula Rhei Composita *B.P.* '14). *Dose.*—4 to 8 grains. Contains Rhubarb, Aloes, Myrrh, Hard

Soap and Syrup of Glucose. **Pulvis Rhei Compositus** (*B.P.* '14), **Gregory's Powder.** *Dose.*—10 to 60 grains. Gregory's Powder, stored in closed bottles keeps indefinitely. Analyses of a number of samples.—J. F. Liverseege, P.J. ii./26,144. **Syrupus Rhei Aromaticus, U.S.** *Dose.*—2½ drachms. Aromatic Tincture of Rhubarb 150, Potassium Carbonate 1, Syrup to 1,000. **Tablets of Rhubarb Soda and Ginger** contain Rhubarb 3 grains, Sodium Bicarbonate 2 grains, Ginger 1 grain. **Tinctura Rhei Composita** (*B.P.* '14). *Dose.*—½ to 1 drachm repeated, 2 to 4 drachms single dose. 1 in 10 of 45% Alcohol flavoured with Cardamom and Coriander. **Tinctura Rhei Aromatica, U.S. X.** *Dose.*—60 minims. Rhubarb 20, Cinnamon 4, Cloves 4, Nutmeg 2, Glycerin 10, Alcohol 50, Water 40.

Pilulæ ex Franck. *Syn.* Pildoras de Franck, F.E. VIII.

Powdered Rhubarb 1 Gm., Powdered Aloes 4·5 Gm., Powdered Jalap 4·5 Gm. Mix with a sufficient quantity of syrup and make 100 pills. *Dose.*—1 to 3 pills.

Acute bacillary dysentery.—Rhubarb ½ teaspoonful of powder in cachets every one, two or three hours, until the rhubarb appears in the stools. Stated to be magical.—R. W. Burkett, L. ii./21,254.

A mixture consisting of Compound Rhubarb Powder 1 oz. (sometimes 2 oz.) and Chloroform Water to 2 oz., in bacillary dysentery in children, causes rapid disappearance of symptoms, but of no use in adults. *Dose.*—1 teaspoonful every 2 hours to a child of 2 years.—A. Castellani, Int. Conf. Trop. Am., 24,424.

Rhubarb Leaves.—Notes on use of.—L. i./17,708. Poisoning by, *ibid.*, 847.

Air dried leaves contain over 0·2% oxalates reckoned as Oxalic Acid with Malic Acid 0·3 to 1·7%.—W. Kirby, P.J. i./17,497 ; ii./17,11.

Rhus aromatica. (*Anacardiaceæ*) (Sweet or Fragrant Sumach). The bark of this Canadian and U.S. plant contains Tannin and Volatile Oils. *Dose.*—5 to 30 grains has given results in incontinence of urine. Said to act on the muscle fibre of the bladder. Liquid Extract 1=1. *Adult dose.*—10 to 30 minims. 5 minims thrice daily to children under two years, and 10 minims to children 8 years.

Rhus Glabra, U.S. X. Smooth Sumach Berries (dried, ripe fruit of *Rhus Glabra* Linné). *Average dose.*—15 grains. Fluid Extract U.S. X. is a glycero-hydro-alcoholic extract, 1=1. *Dose.*—15 minims (1 Cc.). Diuretic. The bark is also occasionally used as a tonic and astringent.

Rhus Toxicodendron. (*Anacardiaceæ*). *Syn.* **Poison Oak.**—Poison Ivy Leaves. **Tincture.** *Dose.*—2 to 15 minims. Imported from North America, prepared from fresh leaves, 1, alcohol 2. Used for rheumatism in chronic skin affections, paraplegia, and incontinence of urine from atony of the bladder. Also for hæmorrhoids. Whitla says it gives satisfaction, but may irritate stomach and bowels. The poisoning by the 'Toxicodendrol' contained, takes the form of an itching, burning, erythematous and herpetiform rash. For a treatise on skin eruptions of this type see A. Whitfield, L. ii./21,61.

'Toxicodendrol' 0·005 mgr. applied to the skin is sufficient to produce local symptoms with pain.—J.A.M.A., per Jl. Trop. Med., June 1/23,208.

Tincture of Sanguinaria Canadensis dabbed on with a soft cloth, is a remedy for the irritation, as also Calamine Lotion.

Compresses of Borax 3%, Permanganate of Potash 1—2%, or 10% solutions of Sodium Hyposulphite or Magnesium Sulphate advised. Lead lotions and ointments should be avoided.—E. A. Sweet and C. V. Grant, per T. D. B. Vol. 17/21,264.

Lacquer dermatitis cured with Rhus toxicodendron Antigen. The lacquer is prepared from sap of *Rhus vernificera.*—C. M. Williams, Arch. Derm. & Syph., Dec. '25,851, per Pres. Oct. '26,351.

Poison Oak Extract successful in the treatment of over 80% of cases of Poison Oak dermatitis.—per Jl. A.M.A. ii./25,1002.

Swab skin with 5% Potassium Permanganate—recovery rapid. A 5% Ferric Chloride solution in 50% Glycerin, washed freely on skin will act as preventive of dermatitis.—Am. Jl. Pharm., June '28,416.

Rosæ Gallicæ Petala (*B.P.* '14). U.S. X. The fresh and dried unexpanded petals. **Confectio Rosæ Gallicæ** and **Infusum Rosæ Acidum** and **Syrup Rosæ** are given. Infuse 15 minutes. **Fluidextractum Rosæ,** U.S., 1=1 Glycero-hydro-alcoholic.

Mel Rosatum P. Jap. III. (now omitted). Macerate Rose Petals 1 in dilute Alcohol 5, 24 hours with shaking, press and mix with the liquor Honey 9, Glycerin 1, and evaporate to 10.

Rubia Tinctorum (*Rubiaceæ*), Dyer's Madder. The root of this plant is known in Germany as **Krapp-wurzel.** A native of Southern Europe and the Levant—cultivated in Holland, etc. A dye stuff yielding Alizarin, Xanthopurpurin, etc., not to be confused with the Indian Mudar (Calotropis). It has been used in amenorrhœa and rachitis.

Rubidium Bromide, RbBr. Colourless crystals, soluble 1 in 1 of water. Has given good results in epilepsy. *Dose.*—5 to 30 grains.

Rubidium Ammonium Bromide, $RbBr3NH_4Br$., has been stated to be more favourable than Potassium Bromide in some cases and an average dose of 90 grains daily is advocated.

Rubidium Iodide, RbI, is soluble in water about 1 in 1, and is employed for the same purposes as Potassium Iodide, as in syphilis and coryza. Some authorities give 5 grains as max. dose.

Cæsium Chloride, CsCl, is stated to increase blood pressure and retard the heart movements to a slight extent. The Bromide is supposed to control epilepsy better than the other Bromides. Cæsium and Ammonium Bromide ($CsBr+3NH_4Br$) is also prepared. White crystalline powder, readily soluble in water. *Dose.*—15 to 45 grains in epilepsy.

Cæsium resembles the quaternary Ammonium bases in effects. Studies on Pharmocology of Rubidium and Cæsium.—Hancke & Koessler, J. Biol. Chem. 43; 579 Sept. '20; Kulz & Pauls, Arch. Exp. Path. & Pharm. 110; 351-363, 1926.

Rubus Chamæmorus (*Rosaceæ*).—Cloudberry, Norwegian blackberry, marsh or dwarf raspberry. Also grown in Newfoundland. Known in Russia as Moroshka and in Germany as Torfbeere, Maltebeer, Woollenbeere, and Zwerg Maubeere. The leaves of this are diuretic, useful in nephritis, cirrhosis of liver and cardiac affections. Infusion, 1 in 12. *Dose.*—½ ounce; fluid extract, *dose*, ½ to 1 drachm. Fruit is antiscorbutic and used for hæmoptysis, will also abate fever.

Rubus villosus, a species of Blackberry. *R. Idæus*=Raspberry.

Rumex Acetosa, the Common Sorrel, found to contain 1·36% Potassium Binoxalate. Oxalis Acetosella, Wood Sorrel, contained 0·86%.—J. A. Purdie, C.D. i./27,127.

Rumex obtusifolius — the dock. — Dried root was found to contain 0·447% of iron. ✱**Ferascol** (T.M. 315389) TABLETS.—A preparation with nucleins as base; contains 3% of iron. Used in treatment of anæmic girls.

Rumex Crispus.—Yellow Dock (*Polygonaceæ*). The root contains Emodin, Chrysophanic Acid and Rumicin,—the last (*Syn.* Rumin). *Dose.*—1 to 4 grains in scrofulous affections, dyspepsia, astringent and tonic. Tincture 1 in 10, Alcohol 50%. *Dose.*—1 to 10 minims. **Unguentum Rumicis.**—Fresh Yellow Dock Root 1, Benzoated Lard 2, warmed two hours and strained. Used like Chrysarobin applications.

Ruta Graveolens—(*Rutaceæ*). *Dose.*—10 to 30 grains. Contains about ¼% Volatile Oil Sp. Gr. 0·880 (consisting of Methyl Nonyl-Ketone $CH_3CO.C_9H_{19}$ and Methyl-heptyl Ketone). *Dose.*—2 to 5 minims. In amenorrhœa and menorrhagia. Large doses have been given to procure abortion.

Confectio Rutæ. *Dose.*—1 to 2 dr. Fresh Rue, Caraway, Bay Berries of each 1½, Sagapenum ½, Black Pepper ¼, Honey 16. Add the first three in powder by degrees to the Sagapenum melted in the Honey with water *q.s.* Carminative and antispasmodic. Sometimes used as enema in infantile convulsions. **St. G. H.** has Rue 6, Caraway 6, Bay Berries 6, Black Pepper 1, Asafœtida 1, Honey 64, Water *q.s.* 180 grains of this with 20 ounces of Chamomile Infusion to prepare *Enema Rutæ.*—St. G. H.

℗ **Sabina,** U.S. VIII. *Average dose.*—7½ grains. FR. CX. has this as max. single dose. Max. during 24 hours 15 grains. Tops of *Juniperus Sabina* (*Savin*), Linné (*Coniferæ*). ℗ **Oleum Sabinæ.** *Dose.*—1 minim. Has emmenagogue and abortifacient properties.

℗ **Unguentum Sabinæ,** *B.P.* '85. Melt Lard 16 and Wax 3 on a water bath, add fresh Savin tops bruised 8 and digest 20 minutes and express through calico. Freshly made is used in conjunction with blisters in rheumatoid arthritis, *see* Cantharides.

Sagapenum.—*Dose.*—10 to 30 grains. A gum-resin with taste resembling asafœtida, and properties similar to this and galbanum, for use in amenorrhœa and hysteria.

Salep.—Tubera Salep, P.G. VI., Ph. Ned. V., P. Belg. IV. Dried tubers of various species of Ophrydinæ—Orchis mascula and others. (N.O. *Orchidaceæ.*)

When fresh have bitter taste. They are immersed in boiling water on collection and dried ; contain mucilage and have nutritious and demulcent properties ; allay gastro-intestinal irritation. Mucilago Salep 1%, P.G. VI. Freshly made. Salep is much sold in the Indian Bazaars as an article of diet.

Salix nigra.—The bark of this, the black or pussy willow, is used as a sexual sedative, tonic and astringent, and given for gonorrhœa and spermatorrhœa, Liquid extract, 1 in 1. *Dose.*—¼ to 1 drachm. *Flavoring.*—Syl Lavandulæ. Solid Extract. *Dose.*—1 to 5 grains. Relieves ovarian pain and nocturnal emissions.

Salvia. Sage (*Labiatæ*). *Dose.*—15 to 30 grains. Dried leaves, aromatic, astringent, tonic.

Sambuci Flores (*Sambucus nigra—Caprifoliaceæ*), Elderberry flowers (*B.P.* '08). Infusion and pomade are used as domestic remedies for sores, bruises, etc. **Aqua Sambuci** (*B.P.* '08) is prepared from the fresh flowers (or flowers preserved with common salt), a frequent ingredient in lotions for the eyes and skin. Contains the glucoside Sambunigrin.—E. Bourquelot, B.M.J. i./21,59.

Unguentum Viride, St. G. H. Gum Elemi 1¼ drachms, Prepared Suet 2½ drachms, Olive Oil 20 minims, Turpentine 40 minims, Copaiba 1 drachm, Green Elder Ointment to 1 ounce (apoth.).

Sanguinaria Canadensis (*Papaveraceæ*). 'Blood Root.' Expectorant, emetic, tonic, for cough. *Average dose.*—2 grains. The commercial drug contains 3 to 4% total Alkaloids.

A resinioid Extractive Sanguinarin. *Dose.*—¼ to 1 grain, is made.

Sanguisorba Officinalis. *Syn.* POTERIUM SANGUISORBA : PIMPINELLA (*N.O. Rosaceæ*) : GREATER BURNET. *Syn.* GARDEN BURNET. Herb used. Has astringent and hæmostatic properties : also diuretic. Commonly used locally in burns and scalds.

Sansiviera. The rhizome of *Sansiviera thyrsiflora* (South Africa). We found it to contain no alkaloid. The root possesses laxative properties, it is free from griping action, and pleasant to take. The Kaffirs chew a stick of the fresh root at a time, and swallow the juice for use as an anthelmintic, and more particularly for the treatment of hæmorrhoids. Should be given in bold doses, as the active constituents only exist in small proportion. **Liquid Extract.** *Dose.*—2 to 4 drachms. Prepared as Liquid Extract of Liquorice. As a laxative. **Solid Extract.** *Dose.*—10 to 20 grains for pills and capsules.—Oliver.

Saponins are toxic glucosides contained in Sarsaparilla and Quillaia, etc. The word "Saponin" is a collective one, implying a group of Nitrogen-free glucosides. A sample of "Saponin" examined by the author had *solubility*, Water 1 in 2, Chloroform 1 in 10, S.V.R. 50% 1 in 3. Death from Saponins is preceded by a long incubation period with the symptoms of central paralysis. Fish die when the water they are in contains 1 in 100,000. Saponin in Salt and Carbolic Acid baths is said to aid the action of all drugs which stimulate the skin. The nasal mucous membrane is stimulated and produces copious skin secretion by the action of dilute spray, gargle or irrigation. Saponins are anthelmintic and diuretic.

The addition of Saponin to insecticidal emulsions is advantageous.—Na.

Saponins, various, described.—J. G. Driver and A. G. Trease, P.J. i./27,623.

Sarsæ Radix, Sarsaparilla. *Smilax ornata* (*B.P.* 1898). (*Liliaceæ.*) *Constituents.*—Saponins and allied bodies, see 17th Edn., p. 691. **Liquid Extract** (*B.P.* 1898). *Dose.*—2 to 4 drachms. **Liquor Sarsæ Co. Conc.** (*B.P.* 1898). *Dose.*—2 to 8 drachms. In chronic rheumatism, skin affections and as a "blood purifier" and in syphilis. It was of doubtful value even 150 years ago. *Incompatible* with Alkalis.

Decoctum Zittmanni Fortius. *Dose.*—3 to 6 ounces.

Sarsaparilla (cut small) 200, Water 5,200, maintain at 35° to 40° C. for 24 hours, then add Potash Alum 10, Calomel 8, Precipitated Cinnabar 2. Heat on a water-bath for three hours and add Bruised Anise and Fennel of each 10, Senna leaves (cut small) 50, Liquorice Root (cut small) 20. Continue heating for 15 minutes, strain and press, passing sufficient water through the marc to make up to 5,000.

Decoctum Zittmanni Mitius. *Dose.*—3 to 6 ounces.

Sarsaparilla 100, Water 5,200, Lemon Peel, Cassia Bark, Cardamoms and Liquorice of each 6. Proceed as in making the stronger decoction.

Both these preparations have been used in syphilis and wasting diseases.

Sassafras Radix (*B.P.* 1898). *S. officinale*, or *S. variifolium* (*Lauraceæ*). The oil (*Oleum Sassafras*, U.S. X), containing Safrol, destroys the vitality of pediculi; it should be applied with a stiff brush, but not touch the skin yet, if so, a little bland oil allays the irritation it causes. Safrol $[C_6H_3C_3H_5(OOCH_2)\ 1:3:4]=162{\cdot}078$. Obtained from sassafras oil, camphor oil and other volatile oils, is used for scenting cheap soaps, also in manufacture of heliotropin, and as an anodyne liniment in subacute rheumatism. Colourless liquid. Optically inactive. Soluble in an equal volume of strong alcohol and in 30 of 70% alcohol. *Dose.*—20 to 30 minims.

The Sp. Gr. of the oil is usually 1·068 to 1·086. O.R. + 1° to + 3°.

It is used for all lice and nits in pediculosis. In treating ringworm, the hair is cut close round to identify the patches, and the oil applied twice a day by a brush. This is continued for a few weeks if necessary. Non-irritating and pleasant to use, prevents spread of the infection, and destroys the fungus. The oil in capsule form (3 minims) may have the power of reducing body weight.

As an insecticide for dogs and cats Safrol, or Oil of Sassafras, may be extremely toxic in some cases.—P.J. ii./25,576.

Saw Palmetto.—A palm growing in America. Possesses sedative, tonic and diuretic properties. Is largely used in urethritis, gonorrhœa, dysmenorrhœa, impotence, cystitis. A liquid extract 1=1. *Dose.*—½ to 2 drachms.

Flavoring.—Glyl Lavandulæ (full dose). A solid extract is also prepared. *Dose.*—3 to 5 grains in pill or tablet. Is also frequently combined with Santal in a miscible form.—'Sanmetto.' **Sabal** (was in U.S.) is the partially dried ripe fruit.

Scammoniæ Radix (*B.P.* '14). *Convolvulus Scammonia* (*Convolvulaceæ*), containing about 10% Resin and 15% Sugar. **Scammonium** (*B.P.* 1898). *Dose.*—5 to 10 grains. Emulsifies with water. The gum resin exuding from the living root on incision. **Scammoniæ Resina** (*B.P.* '14). *Dose.*—3 to 8 grains (0·2 to 0·5 Gm.). Prepared by exhausting the root of Orizaba Jalap with Alcohol 90% and pouring the concentrated tincture into water in a thin stream. Occurs in greenish lumps. Soluble almost entirely in Alcohol and Ether. **Scammonin** is this substance purified. Purgative in obstinate constipation. Produces copious watery evacuation in a few hours. Does not act until reaching the duodenum. *For further details of C. Scammonia and Ipomœa Orizabensis, see Vol. II.*

Criticism of *B.P.* Tests for Scammony.—D. B. Dott, P.J. i./30,213,287.

Scilla (*B.P.* '14). *Dose.*—1 to 3 grains. The bulb of *Urginea Scilla* (*Liliaceæ*) (*U. maritima*, U.S. X), with membranous outer scales removed, cut into slices and dried. Resembles Digitalis in action. It is also expectorant and more diuretic. Preps. are: **Acetum Scillæ**, strength 1 in 4·5 w/v in dilute Acetic Acid.—J. H. Franklin and G. G. Hammond, P.J. ii./22,85. *Dose.*—5 to 15 minims. **Pilula Scillæ Composita** and **Tincture**, 1 in 5 of 60% alcohol.

A manufacturer's Tinct. Scillæ *B.P.* found to be exceptionally strong physiologically, creating a dilemma for him.—C.D. i./27,287.

In U.S. X. are **Acetum** 1 in 10; **Fluidextract**, 1=1 Alcoholic. *Average dose.*—1½ minims. **Syrup**=Vinegar of Squills 45, Sugar 80, Water to 100; ℗**Syrupus Scillæ Compositus**, *Average dose.*—30 minims=Fluidextract of Squill and of Senega each 80, Antimony Potassium Tartrate 2, Syrupus *q.s.* to 1,000. **Tincture**, U.S. 1 in 10.

Squill Preparations U.S. X. are now biologically standardised. *cf.* Digitalis, *Vol. II.*

Poudre de Scille.—Fr. Cx. Max. dose during 24 hours, 15 grains. Fr. Cx. has **Extract** (Alcoholic), with max. doses provided, also **Tincture** 1 to 5 Alcohol 60%, max. single dose 25 minims, max. during 24 hours 85 minims approximately.

As a heart tonic it is not satisfactory used by itself. It seems to spend its force on the auricles, leaving the ventricles hardly affected at all. Its glucosides are failures.—G. Sharp, P.J. i./16,347, *cf.* action of Digitalis.

✱**Anasarcin** (T.M. 250285) **Tablets** contain Scillipicridin and Scillitoxin.

For Rats.—Liquid Extract of Red Squill (there are 2 varieties—the red *Urginea Maritima*, is preferred in France) is efficacious. Add to bread and milk. Comparatively harmless to larger animals, advocated by Min. of Agriculture.—P.J. ii./27,524. The rat-poisoning substances appear to be present in significant amounts in the Red Squills only.—F. R. Winton, Jl.

Ph. and Exp. Ther., June '27,137. Barium Carbonate is deadly. Virus not advised.—L. ii./22,1081. *See also* F. W. Smith, P.J. i./21,139.

Scopola Carniolica (*Scopolina atropoides*) and **S. Japonica** contain Solanaceous alkaloids. *See* Edn. XVIII., p. 857.

Scutellaria. *Dose*, 5 to 15 grains. Dried herb of *Scutellaria lateriflora*, Linné (*N.O. Labiatæ*). Used in the form of dry, greenish-brown powdered extract (scutellarin). *Dose*, 1 to 5 grains. For epilepsy, insomnia, and hiccough. **Liquid Extract** 1=1. *Dose*, 5 to 15 minims.

In epilepsy a simple infusion or extract appears to stimulate the kidneys and increases output of urea and uric acid. In chorea effects even more marked.

Sempervivum tectorum, Common Houseleek. The bruised recent leaves are employed as cooling applications to burns and other external inflammations. Succus (preserved with 20% Alcohol) is said to cure warts.

Senecio.—Ragwort. *Senecio Jacobœa* and *S. aureus* (*Compositæ*) are emmenagogues, and have been employed in amenorrhœa and dysmenorrhœa especially when due to chill. Liquid Extract, 1=1 of herb. *Dose.*—20 to 60 minims. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 2 drachms. *Senecin* is a dry extractive. Two alkaloids, [P] Senecionine and [P] Senecine are contained. Excellent in gastralgia and dyspepsia.

Tablets Senecio Compound. A proprietary preparation.

Mist. Senecio Co. A proprietary containing Senecio, Hydrastis, Pulsatilla and aromatics. *Dose.*—In dysmenorrhœa, ½ to 1 drachm two or three times daily. As emmenagogue 2 to 4 drachms. A uterine and nervine tonic.

Senecio latifolius.—Closely related to the common groundsel (*S. Vulgaris*). This and various other species induce fatal poisoning in cattle and horses —hepatic cirrhosis—in South Africa, Canada, and New Zealand.

Two new alkaloids isolated.—[P] Senecifoline M.pt. 194° C. and [P] Senecifolidine M.pt. 212°. The former has been reported on by Cushny as being poisonous to animals. The plant is thought to be responsible for 'Molteno disease' in cattle in S. Africa.

Senega (*B.P.* '14), U.S. X. Dried root of *Polygala senega* (*Polygalaceæ*). An expectorant, contains Senegin. **Infusion** 1 in 20, **Concentrated Solution** 1 in 2 (*B.P.* '98). **Fluidextract**, U.S., 1=1. *Dose.*—15 minims. The alkali contained forms soluble compounds with the pectin principles in the root thus preventing gelatinisation. (Caspari). **Syrup.** U.S. *Dose.*—1 drachm.—Fluidextract 20, Ammonia Water 1, Simple Syrup to 100. The concentrated infusion of commerce is apt to deposit, owing to action of enzymes; less likely to if made with a little alkali. **Polygalæ Radix**, P. Belg., is the same. Fluidextract, P. Belg. yields 25% solid matter. **Tincture** (*B.P.* '14) 1 in 5 Alcohol 60%.

(P) *Infusum Polygalæ Compositum. Dose.*—½ to 1 ounce. Senega 10, boiling water 165, potassium iodide 5, paregoric 20, lobelia tincture 10. In use on the Continent.

Tisane de Polygala (Root)—(Fr. Cx.), 1 in 100 boiling water; infuse ½ hour.

Ext. Senegæ Liq. Estimation by determining its Saponin content from its hæmolytic index. A 0·5% solution of the dried residue is made in a buffer solution of pH = 7·3, and a range of quantities from 0·1 to 1 Cc. of the solution added to tubes containing 1 Cc. of a 2% suspension of defibrinated human blood in Phosphate buffer mixture, all being made up to 2 Cc. The hæmolytic index is calculated from the tube where total hæmolysis occurs. The results of 7 examinations showed that the percentage of dried residue could vary from 8·8 to 28·6, with a corresponding variation of the hæmolytic index from 57 to 1,100.—P.J. ii./28,37.

Senna (*B.P.* '14). The dried leaflets of either *Cassia acutifolia* (Alexandrian) or *C. angustifolia* (East Indian or Tinnevelly) (*Leguminosæ*). Activity due to Cathartic Acid. Constituents are Emodin (Tri-oxy-methyl-anthraquinone), Chrysophanic Acid, etc. The legumes or fruit, **Sennæ Fructus**, of both these varieties are in use. These are stronger than the leaves.—Tschirch. Experience has shown that the legumes are more active if *green*.—W. H. M. With aid of radio-graphic pictures it has been shown that Senna (infusion) acts only on the colon (peristalsis of). It has little or no action on peristalsis of the small intestine and stomach.

Confectio Sennæ (*B.P.* '14).—*Syn.* Lenitive Electuary. *Dose.*—60 to 120 grains. Contains Senna 10% with Coriander, Figs, Tamarind, Cassia Pulp, Prunes, Extract of Liquorice, Sugar and Coriander. The use of 0·5% Coriander Oil instead of fruit would prevent grittiness in taste. **Confectio Sennæ et**

Piperis L.H. Equal parts of Confection of Senna and Confection of Peppe
Elixir Sennæ, B.P.C. 1901. *Syn.* LIQUOR SENNÆ DULCIS. *Dose.*—1 to
drachms. In this preparation the Cathartic Acid, not being subjected to lon
exposure to heat, is preserved from oxidation; **Cathartic Acid** is sometime
prescribed in doses of 4 to 8 grains in pills but is unstable. **Extractum Senn**
(Leguminum) Liquidum, B.P.C. *Dose.*—1 to 2 drachms. Strength 1=
R. Stockman concluded by comparing effects of preparations from the who
fruit, from the *pericarp freed from seeds*, and from the uncrushed seeds, tha
the second is best.—B.M.J. ii./15,128. **Elixir Sennæ Leguminum**, *Martindal*
Dose.—1 to 3 drachms, is prepared, as Elixir Sennæ, B.P.C. 1901, using legume
instead of leaves. **Mistura Sennæ Composita.**—*Syn.* BLACK DRAUGHT (*B.P.*
'14). *Dose.*—1 to 2 ounces. **Syrupus Sennæ** (*B.P.* '14). *Dose.*—½ to
drachms. 1 drachm = ½ drachm of leaves approx. **Tinctura Sennæ Composit**
(*B.P.* '14.) *Dose.*—4½ to 1 drachm repeated, 2 to 4 drachms for a single dos
Senna 1 in 5, with carminative. **Tinctura Sennæ Leguminum.** The sam
strength as above using legumes in place of leaves.

An accurate method of identifying broken commercial samples of Alexandria
and Indian Sennas. The vein islet numbers of 4 sq. mm. give different figure
for different species. The method is also applied to Buchu, Coca, and Dig
talis.—F. A. Levin, Qtrly. Jl. Ph.'29,17.

✱**Prunol** (T.M. 511369). Prune Jelly. Contains Prunes, Gree
Ginger and about 7½% Senna. Sir James Paget's prescription for constipa
tion and colitis—action continues several days. Clears the colon of fæca
matter and relieves toxæmia.

Serpentariæ Rhizoma (*B.P.* '14), U.S. X. *Average dose.*—15 grains (1·0 Gm.
Dried rhizome and roots of *Aristolochia Serpentaria* (*Virginia Serpentary*) c
of *A. reticulata* (Texas *Serpentary*) (*Aristolochiaceæ*). Bitter tonic. Infusio
(*B.P.* '98), 1 in 20, Concentrated Solution 1 in 2 (*B.P.* '98), Tincture (*B.P.* '1
1 in 5, 60% Alcohol. **Liquid Extract**, 1=1 Hydro-alcoholic. *Dose.*—5 t
15 minims. **Tincture**, U.S. VIII., 1 in 5 of Alcohol and Water in proportio
of 65 and 35.

Sethia. This name is given to a few species of the genus *Erythroxylo*
(*N. O. Linaceæ*).

S. Acuminata leaves are used in Ceylon as a vermifuge and anthelmintic
—C.D. i./30,340.

Shea Nuts and Shea Butter. From the Shea tree, *Butyrospermum Parki*
Kotschy (*N.O. Sapotaceæ*), a native of W. Africa. The pulp of the fruit i
eaten by the natives and by animals. The nuts are 1½ in. in length and 1 in
in diameter, with shells of a light brown colour; the dry kernel is firm and c
a dark chocolate-brown colour and varies in weight from 3 to 5 Gm. Th
'Butter' when clean and well-prepared is greyish or yellowish-white and nc
unpleasant odour, and consists of Oleic Acid 60%, Stearic Acid 30—35%, an
Lauric Acid 3—4%. Used largely as food in W. Africa, and in Europe i
candle and soap-making—they grow in immense quantities on the Gold Coas
—Bull. Imp. Inst., Vol. X (1912), No. 2.

Feeding experiments with Shea Nut Cake and Butter being conducted.—
Imp. Inst. Rept. 1930.

Shellac.—A resinous substance formed by a scale insect, *Tachardia Lacc*
(fam. *Coccidæ*, ord. *Hemiptera*), which lives on a large number of trees, *e.g.*
Butea frondosa, *Ficus religiosa*, *Schleichera trijuga*, *Shorearobusta* (Wild Lac
The plants specially cultivated for Lac are *Acacia arabica* and *Cajanu*
indicus.

Simaruba officinalis (*Simarubaceæ*).—*Syn.* MOUNTAIN DAMSON. *Dose.*—
15 to 30 grains. Infusion 15 grains to 1 ounce in boiling water (infuse 1
minutes). *Dose.*—1 ounce. Has bitter taste, is astringent, and useful in
dysentery. Contains a colourless crystalline bitter glucoside. **Decoctum**
Simarubæ et Punicæ Granati.—Add Simaruba Bark, Pomegranate fruit rin
and Gum Arabic of each 15 Gm. to a litre of water and boil down to ½ litre
Dose.—30 Cc. three or four times daily. Cures dysentery rapidly. (Egypt.
—Ph. Notes. The quantities and the ingredients have been varied from tim
to time. The Ministry of Health replaced Cinnamon for the Acacia.—C. D
1920,1320. *See also* Mar. 26, 1921,442.

Solanum Carolinense.—Horse-nettle. A native of Southern U.S. A liqui
extract 1=1 is employed in epilepsy. *Dose.*—15 to 60 minims.—H.

Solanum Dulcamara (*Caules Dulcamaræ*, P. Austr.) (*Solanaceæ*).—Woody
Nightshade. Bittersweet. The dried herb is employed. Sedative analgesic

Solanum Nigrum.—Black or garden Nightshade. The leaves are said to be eaten boiled in the Isles of France and Bourbon and Hawaii Islands.

E. N. Cust, Director of Research, Directorate of Agriculture, Rustam-Baghdad, writes us (1932) :—'The plant which is common in Iraq is eaten by the Arabs, who call the plant "'inab-uth-tha' lab" or "'inab-udh-dhib" (which means fox's grapes or wolf's grapes). I have myself eaten the raw berries on several occasions though not in large quantities.'

The Wonderberry is stated to be from a luxuriant form or hybrid of Solanum Nigrum and to be edible (cooked). Containing 0·3% of *Solanine*. Tomatoes also contain this alkaloid. It is taken as a diuretic for skin diseases and the juice for the enlargement of the liver.

Solanum Sodomæum.—The fruit of this plant is the apple of Sodom—when ripe is a pale yellow berry averaging 1 inch in diameter. Employed for destroying parasites in S.A., also for itch, ringworm, etc.—Juice of the fruit is extremely acid and bitter—it also contains Solanine.—Oliver.

Solanum Tuberosum. Extractum Solani Liquidum.—The concentrated juice of the potato preserved with glycerin has been used in synovitis, gout, lumbago, and rheumatism—as also Liniment, plaster and Ampoules.

Mosaic disease of tobacco leaf and other plants, leaf roll of the potato, and Botrytis of grapes compared with animal diseases. Leaf roll and mosaic are carried by aphides.—V. H. Blackman, B.M.J. ii./22,718.

Sorbus Aucuparia.—The Mountain Ash. A liquid extract is prepared, 1=1. *Dose.*—10 to 30 minims. A useful mild aperient ; also has diuretic and emetic properties. Berries have sialogogue effect. They act best when not too ripe. —W. Johnson Smyth, B.M.J. i./28,243.

Sorghum. Chinese Sugar Cane. *Anitropogon arundinaceus* (*Gramineæ*) : Indigenous in China and India and cultivated in U.S. Proprietaries such as 'Lithiated Sorghum Comp.,' are popular in America in bladder affections.

Soya Bean.— *Glycine Hispida* (*Leguminosæ*). Cultivated in China and Japan for human use and latterly in America and Europe, chiefly for forage. A method of use in the East is to boil until soft and then ferment in a warm cellar—the resulting 'cheese' being known as 'Natto.'

It contains 38·5% Protein (on dry) and 20% fat. For this reason, no doubt, the Chinese and other rice-eating people require so little meat. It contains practically no Starch—the latter fact is said to be due to presence of a diastase in the bean capable of converting Starch formed, two-thirds into Sugar, one-third into Dextrin. Has been used as an addition to ordinary diabetic dietary. **Soy Flour** is even more serviceable, containing almost $\frac{1}{3}$ more Protein than the bean, this being due to the removal of the fibrous hulls, which contain but little Protein. For further data *see* Edu. XVIII., p. 860, and XIX., p. 887.

'Synthetic Milk' made from it is indigestible and its adoption was found impossible in Germany even during the war. An improved Soy Meal is better and is almond-like in taste. In protein value, the haricot bean is the only serious competitor. It should be tried on a large scale amongst the poorer classes.—T. R. Parsons, L. i./27,267 ; *ibid.*, 241.

Soya Bean Milk. The shells are removed after baking overnight in 3 times the weight of water to beans, then ground and boiled for 5 minutes and filtered through a sieve. To every 1,000 Gm. of filtrate add 20 Gm. of Starch previously made into a paste with some of the filtrate, 60 Gm. of Sugar, 1·5 Gm. Calcium Lactate, and 1 Gm. of Salt. The addition of Cod Liver Oil is essential. —B.M.J.E. i./31,93.

Tuberculous children and others with bad nutrition have been treated with the meal. The Berczeller Process (a Hungarian development) of dealing with the bean renders it suitable for human food, removing the bitter flavour and making it keep. The product is termed *Soyolk*. Soya Flour contains about 4 times as much protein as Wheat Flour and about 15 times as much fat. Suggested as addition in making bread, biscuits, and confectionery.—H. B. Cronshaw.

✱**Soyolk.** (T.M. 495050, 502253, Cl. 42). A flour made from the Beans containing 20% of fat, which does not turn rancid. It has high content (45%) of Protein, 16% Carbohydrates, principally Sucrose and Dextrin, no Starch, and Vitamins A, B, D, and E. Suggested as a basic food for infants, *i.e.*, to blend with other ingredients and reduce the protein and increase the sugar, *e.g.*, with Lactose. The Iodine value is high—132, against human milk fat 46 and cow's 32.

Sobee. A mixture of Soy Bean Flour 67·5% and Barley Flour 9·5%, plus

Olive Oil 19%, Sodium Chloride 1·3%, and Calcium 2·7%, the approx. analysis being Fat 22·50, Protein 33·20, Carbohydrate 32·61, Ash 8·51, Moisture 3·18. Used as a milk substitute for infants with milk idiosyncrasy. Infants take it well, digest it, and thrive on it.—L. W. Hill and H. C. Stuart, Jl. A.M.A. ii./29,986 ; *see also ibid.* 989.

✱**Narcosan** (T.M. 493964). A preparation made from Soy Beans. Stated to be specific for drug addiction but proved to have no merit. Report of Committee appointed by Mayor of New York after trial in 100 cases.—A. Lambert, Jl. A.M.A. i./29,147.

Soya Oil has Iodine Value 121 to 123. P. Svec. X has 115 to 137. It is much used in soap making. P. Svec. X gives formulæ for Sapo Kalinus, Spiritus Saponis Kalini and Linimentum Saponis Camphoratum, using it. For further particulars *see* P.J. ii./11,407. *Cf. Iodine Numbers of Fats.*

℗ **Sparteinæ Sulphas** $C_{15}H_{26}N_2.H_2SO_4.5HO = 422{\cdot}3734$ (water content varies). Fr. Cx. *Dose.*—¼ to 1 grain increased. Fr. Cx.—*Max. single dose* ¾ grain, max. during 24 hours 4 grains.

The sulphate of a volatile liquid alkaloid, $C_{15}H_{26}N_2 = 234{\cdot}2488$, in colourless crystals. *Soluble* 3 in 2 of water, and about 1 in 6 of alcohol 90%. Obtained from the leaves and branches of Broom, *Cytisus scoparius*. It contains also a crystalline principle Scoparin.

℗ **Hypodermic Tablets** contain ½ grain.

Sparteine possesses little digitalis action ; it acts like conine, atropine, curarine and cocaine but feebly. In its resemblance to conine it acts on the central nervous system. Like atropine it paralyses the vagus nerve, but only in very large doses, it also paralyses the motor nerve-endings, and in this respect resembles Curarine. It perhaps also paralyses the sensory nerves—when injected it anæsthetises like cocaine.—Gordon Sharp, P.J. i./16,348. Dr. Samuel Johnson passed 20 pints of urine in 24 hours after taking the infusion. In the past it has been given in morphine habit. In post-operative suppression of urine. *Large doses*—1 to 2 grains hypodermically every 3 to 6 hours—have been given.

The pharmacological action of Sparteine and related alkaloids.—R. St. A. Heathcote, Jl. Ph. & Exp. Ther., June, '26,431.

℗ **Oxysparteina,** $C_{15}H_{24}N_2O = 248{\cdot}2032$ is an oxidation product of Sparteine. Acts as a cardiac stimulant. The **Hydrochloride** and **Sulphate** are prepared.

Scoparin $C_{22}H_{22}O_{11}$, a phenolic body in broom tops. Has definite diuretic action in doses of 5 to 8 grains.—C.D. i./30,58.

℗ **Sparteine Periodide.** $C_{15}H_{26}N_2.3I = 615{\cdot}0148$.

Dose.—½ to 1 grain, increased if necessary. 3 grain doses have been given. Black crystals containing 38% of Sparteine.

Pharmacology. On treatment with Physiological Acid, it is to a large extent split up (12·4% of the Periodide is liberated to this solution), while subsequent treatment with Physiological Alkali liberates only a small amount.

No discomfort caused and no untoward symptoms observed from ¼ and ½ grain doses. *Solubility.*—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water. May prove of service as a new method of giving the active principle of Broom as diuretic. *Dispensing Note.*—To be given alone, in cachet or ' slipule,' preferably after meals.

Spigelia. *Sp. Marilandica* (*Loganiaceæ*), Indian Pink-root. *Average dose.*—60 grains. Fluidextract, U.S. IX. 1=1 diluted Alcohol. *Average dose* 1 drachm. Is employed for round and tapeworm, but is very potent.

Stannum, Sn=118·7 Tin. Given internally pure tin powder is probably not absorbed. Was formerly used as a tæniacide. From 4 to 15 Gm. were given suspended in syrups or made into an electuary and followed in from 3 to 6 hours by a brisk cathartic. Some of the salts (chiefly Chloride) are credited with vermicidal properties. In dose of 1/16 to ½ grain the chloride has been used as an antispasmodic in chorea, epilepsy and other convulsive diseases.

Stanni Oxidum (Stannic). $SnO_2 = 150{\cdot}7$. Greyish white in colour. Used chiefly technically and as cosmetic diluted, *e.g.*, as nail polish.

Distinguish from Stannous Oxide SnO which is dark grey—nearly black.

'Putty powder' is usually a mixture of tin and lead oxides or a stannate of lead, used for polishing glass.

Jungman's Tooth Powder. Tin (Stannic) Oxide 15, precipitated chalk 60, soap 4, sugar 5. Flavour with mixed oils as for Blair's Tooth Powder ; mix these first with the sugar.—P.J. i./22,263.

✱**Staniform.** (T.M. 495430 and 479512.) **Methyl Stannic Iodide.**
Used in the form of powder 3% with kieselguhr or ointment in the local treatment of boils, ulcers, carbuncles, whitlows, acne, eczema, burns, chilblains, etc.

Methyl Stannic Trilactate. An aqueous solution as spray in nasal catarrh.

✱**Stannoxyl** (T.M. 379084) **Tablets.** Contain metal tin and oxide of tin. *Dose.*—Four to eight, children two to four per diem at any hour in the day either in water or eaten dry. 2 Cc. ampoules for intramuscular injection, also Liquid for internal use are made. For boils, carbuncles, furunculosis, acne and styes.

It has been found that tin workers never suffer from boils. Powdered tin is a popular remedy for this complaint. In France, Gregorie & Frouin tried doses of from 0·5 to 1 Gm. of powdered tin or oxide of tin in 50 cases.

Small quantities of Tin act as catalyst and assist synthesis of fatty acids and Glycerin into fat. 2 Cc. of Stannoxyl intramuscularly, in conjunction with 1 drachm of Glycerin in 1 drachm of boiled water intravenously, gave good results in scirrhus of the breast.—J. T. Shirlaw, B.M.J. i./31,74. *Cf.* Glycerin Chapter.

Tin. History of, and process of extraction.—G. Malcolm Dyson, P.J. i./31, 299.

Staphisagriæ Semina (*B.P.* '14). *Average dose* (U.S. IX.).—1 grain.

The seeds of *Delphinium Staphisagria, Larkspur* (*Ranunculaceæ*) contain about 30% of oil and the white crystalline alkaloid. [P] **Delphina.** *Syn.*—**Delphinine.** *Dose.*—$\frac{1}{6}$ grain increased to $\frac{1}{4}$ grain. Soluble in water, alcohol and ether. This acts chiefly on the nervous system, first upon the bulb, next on the sympathetic. Given internally in toothache, neuralgia, earache, rheumatism, dropsy, and spasmodic asthma. Locally an alcoholic solution or ointment, containing 2 to 8%, causes tingling and transient redness like veratrine. (P) One part of the Oil expressed from the seeds to 6 or 12 of perfumed olive or almond oil effectually kills pediculi of all kinds. Remove nits with a mixture of vinegar and proof spirit. (P) **Unguentum** (*B.P.* '14). For scabies and to kill lice. (P) **Fluidextract U.S. IX.** 1=1 Hydro-alcoholic. *Average dose.*—1 minim.

Lotio Staphisagriæ. *Syn.* **Lotio pro Capite.** St. Bart's H.

Boil Stavesacre Seeds 1 drachm with Dilute Acetic Acid 24 minims and water 1 ounce 1 hour, cool, strain and add Quinine Sulphate 1 grain, Glycerin 24 minims, Oil of Sassafras 1 minim and make up to 1 ounce with water.

Stillingia Sylvatica U.S. IX. (*Euphorbiaceæ*), Queen's Root.

Dose.—Average 30 grains. Contains Volatile Oil and Alkaloid (?). Large doses emetic, cathartic; small doses alterative. Is employed in scrofula, syphilis, jaundice, and for piles. **Fluidextract U.S. IX.** 1=1. *Dose.*—30 minims. **Liquor Stillingiæ Compositus** is McDade's Succus Alterans for syphilis. *Dose.*—1 drachm.

Styrax Preparatus (*B.P.* '14). U.S. Thick brownish liquid compound obtained from *Liquidambar orientalis* (*Hamamelidaceæ*). Contains Cinnamyl Cinnamate (Styracin) and other Cinnamic Acid Compounds, together with a large proportion of Storesin, $C_{36}H_{55}(OH)_3$=538·4524. It should contain 20% Cinnamic Acid. Ointments of 20% in Benzoated Lard are used in parasitic skin affections.

Phenyl-propyl Alcohol. *Syn.* Hydrocinnamyl Alcohol occurs in Storax as a Cinnamic Acid ester. It is a thick colourless oil (Sp. Gr. 1·007) with odour resembling Cinnamic Alcohol and hyacinths. It is used in hyacinth, narcissus, jonquil, and like perfumes.—P.R., July 5th, 1914, p. 189.

Certain of the constituents, it is said, are extracted from storax before it comes on the market; *see Edn. XVIII, p.* 861.

Constants for identification and detection of adulterants.—Y.B.P. '27,158.

Phenyl propyl acetate, allied to Styracin, is a synthetic substance used in manufacture of Synthetic perfumes and fruit essences.

Succinum.—Amber obtained from a fossil resin found in Germany. **Oleum Succini.** *Dose.*—1 to 5 minims. Useful in persistent hiccough, asthma, whooping cough and hysteria. Diluted with Olive Oil is rubbed upon rheumatic parts and upon the chest for bronchitis and pertussis.

Genuine Oleum Succini Rectificatum has Sp. Gr. 0·950 approximately. Commercial Oil of Amber is almost entirely derived from the crude resin spirit obtained from colophony resin. It has Sp. Gr. 0·850 to 870. Like the genuine oil it consists chiefly of Terpines.

B.P.C. has Amber Oil 1, Clove Oil 1, Olive Oil 2, as **Linimentum Succini Compositum.**

Artificial Amber The most important constituents stated to be Phenol, Formaldehyde and Ammonia boiled together in a porcelain crucible. Glacial Acetic Acid, Sodium Sulphite, Soda and Hydrochloric Acid are added and the mixture boiled until resinous mass formed.—B.M.J.E. ii./21,45.

Sumbul Radix (*B.P.* 1898). *Syn.* Musk-root. Transverse slices of the root of *Ferula Sumbul* (*Umbelliferæ*). Nervince sedative and antihysteric. Contains aromatic volatile oil, and resin. **Tincture** 1 in 10. *Dose.*—30 to 60 minims. **Fluidextract,** U.S. IX., 1=1 hydro-alcoholic. *Average dose,* 30 minims.

Symphytum officinale (*N.O. Boraginaceæ*).—The Common Comfrey plant having yellowish or purple flowers, perennial, grows on banks of rivers and ditches. Boiled with the root, has been used as a poultice for cancerous tumours, also for hæmoptysis and kidney disease with blood in the urine, as a decoction or syrup. Root pulped was used to stiffen bandages for fractures.

According to investigation of C. J. Macalister and colleagues this plant, which has been used from Saxon days as a 'vulnerary herbal,' contains **Allantoin.** Titherley and Coppin found 0·6 to 0·8% in the air dried material.

A strong (mucilaginous) Infusion of the root. *Syn.* **Mucilago Symphyti.** *Dose.*—1 to 2 ounces. Comfrey Root in coarse powder 1, Boiling Water 20—infuse 20 minutes, strain, cool, and add Chloroform 1 in 500. Applied to an ulcer measuring 3 by 4 inches involving the skin and deeper structures over the upper thorax, for about a week, cleaned it and produced a distinct growth of epithelium from the margins.

Concentrated Infusion.—*Dose.*—2 to 4 drachms. Suitable for dilution 1 with 3 of water. **Liquid Extract.** *Dose.*—2 to 4 drachms 1 in 4 by extracting the drug in coarse powder with water, and preserving with 20% of 90% alcohol. **Solid Extract.** *Dose.*—5 to 10 grains is prepared by extracting the drug with water at about 65° C. and evaporating and powdering.

Elixir Symphyti. *Dose.*—½ to 2 drachms diluted is also made.

Liquid Extract applied on lint to saturation has been found useful to cure old ulcers. The nightly application of the Infusion was found to be the only remedy for pruritus ani in a case where sleep was prevented for weeks together. Internal use of the Infusion satisfactory in gastralgia,—eases pain of gastric ulcer.—W. Bramwell, B.M.J. i./12,12.

It is an old remedy for coughs and weak chests.—B.M.J. i./15,748. This plant and *S. tuberosum* have both the same properties, resembling the COMMON BORAGE, BORAGO OFFICINALIS (*cf.* Tisanes) in many respects, both yielding Allantoin-containing infusions.—B.M.J. i./12,336 (Historical Notes—Prosper H. Marsden. *Ibid.*, pp. 344, 393).

Allantoin.—$C_4H_6N_4O_3$ = 158·0788. *Dose* of Saturated Solution (0·3 to 0·4%) ½ to 1 ounce three or four times daily. *Soluble* in water 1 in 260, in alcohol 90% 1 in 2,360, in alcohol 80% 1 in 1,700, in absolute alcohol 1 in 5,000 (all by experiment). This substance is obtainable in brilliant crystals with indefinite melting point, *i.e.*, decomposes. *Manufacture.*—May be prepared artificially by oxidation of Uric Acid in Alkaline Solution in the cold.

Uses.—Allantoin is a cell proliferant and is used locally as the Saturated Solution. For chronic varicose ulcers, boils, wounds, burns, etc., and after skin grafting. The dressing is applied on lint or gauze and covered with gutta percha tissue, renewed as required. Some use alcoholic solutions (0·5%). Allantoin Ointment 0·3% in soft paraffin suggested for bed sores.—W.H.M. Allantoin is present in animals and in plants, *e.g.*, in the fetal allantoic fluid (hence the name), also in the urine of pregnant women, and in small amounts in normal urine. It may be derived in the latter from vegetable foods—it appears to come from these. It may pass practically unchanged through the human being. It is present in wheat germ, bread, French beans and green peas. Although the Allantoin in the human embryo may be a fœtal waste product, in the economics of nature it may have a function to perform regarding cell multiplication, especially as it is not at once eliminated from the maternal circulation.

Allantoin is not poisonous. It favours rather than inhibits the growth of organisms—demonstrated by experiments on simple forms of life from sea water. Further *B. Coli*, *Staphylococci*, *Streptococci* and *Tubercle Bacilli* are not affected by presence of 0·2% in the culture medium. In Comfrey rhizome it is abundant in the spring but almost absent in the summer (June). Allantoin

(15 minims of 0·4% solution) injected into hyacinth bulbs in process of growth causes them to flower more rapidly.

Metaphosphoric Acid in conjunction with Allantoin has been tried in tubercular sinuses and skin affections internally and hypodermically with promising result.—C. J. Macalister, B.M.J. ii./12,702.

Tamarindus Indica (*Leguminosæ*). *Dose.*—1 to 8 drachms. The preserved fruit contains Tartaric Acid and Potassium Acid Tartrate in considerable quantity, and added sugar about 30%. It is also imported pressed into a solid mass as pulp.

Pastilli Tamarindorum Compositi, P. Aus. Add. VIII. 'Hindu Dates.—Tamarind Pulp 10, Senna in fine powder 3, Sugar 5, Wheat Starch 1. Mix on water bath. Divide into Pastilles weighing about 40 grains each and cover with chocolate. Useful laxatives for children and invalids.

Tanacetum, Tansy.—Leaves and tops of *Tanacetum vulgare.* An aromatic bitter used as a vermifuge, but may cause dangerous irritation. **Liquid Extract,** 1=1. *Dose.*—15 to 30 minims.

Tannia (*N.O Araceæ*). The tubers of this plant contain a large amount of Starch and Calcium Oxalate. They play an important part in the diet in the Tropics. It is necessary to boil the parts used at least two hours to become edible.—A. Clark, Jl. Roy. Soc. Trop. Med., Mar. 9, '29,453.

Taraxacum officinale (*Compositæ*) (*B.P.* '14). *Dose.*—30 to 120 grains Its preparations are: **Extractum** from fresh root. *Dose.*—5 to 15 grains. **Liquid Extract** (*B.P.* '98), 1=1. *Dose.*—½ to 2 dr. *Flavoring.*—Syl Limonis, Syl Cinnamoni, Syrupus Zingiberis. **Succus** (*B.P.* '14), 3 of expressed juice with 1 of alcohol 90%. *Dose.*—1 to 2 dr.

Facts and fancies about Dandelion, and other *Compositæ* from the botanical aspect.—J. Small, P.J. ii./16,157.

Taxus Baccata.—The Yew. [℗] Taxine, an alkaloid, is a constituent. *Dose.*—$\frac{1}{100}$ to $\frac{1}{60}$ grain. Is said to have an action on circulation.

The berries are poisonous. Description.—E. M. Holmes, P.J. ii./15,638,641. Poison probably obtained from Yewberries was used on arrow heads by the Greeks of old.—Sir C. Ballance, L. i./20,5.

Terebinthina Chia, P.L.—*Dose.*—5 to 10 grains. Oleoresin from trunk of *Pistacia Terebinthus*; was used for cancer of the female generative organs.

Teucrium Scordium (*Labiatæ*).—Water Germander. *Dose.*—10 to 20 grains. Contains a volatile oil and a bitter principle. Given for hæmorrhoids and pruritus ani. Diaphoretic; tonic for scrofula, gout, dropsy, flatulence. Liquid Extract. *Dose.*—½ to 1 drachm. (℗) **Electuaire Diascordium,** 'Diascordium,' Fr. Cx. Water-Germander Herb 50, Red Rose petals 20, Bistort Root 10, Gentian 10, Tormentilla 10, Barberry Berries 10, Ginger 5, Long Pepper 5, Canella 20, Siam Benzoin 10, Galbanum 10, Gum Arabic 10, Carbonate of Iron 20, Opium Extract 5, Mellitum Rosæ—Mellité de Rose Rouge 650, Malaga Wine 100—by weight throughout. 15 grains of this Electuary contains 0·006 Gm. (about $\frac{1}{10}$ grain) of Opium Extract.

Thallium. Tl=204·39. This element, resembling lead on the one hand and Potassium on the other, was discovered by Crookes by spectral analysis in residues of sulphuric acid manufacture.

Thallium Acetate. $TlC_2H_3O_2$=263·4134. *Dose.*—1½ to 3 grains was tried in syphilis, but is not equal to mercurials; if given an hour before the commencement of a sweat, was found of value in the night sweats of phthisis. Loss of hair and arrest of perspiration accompany its use.

Epilation in Ringworm—it has been much advocated for this, the direction being to administer it only to children who have not reached the age of puberty in certain specified dosage based on weight of the child. Details, *see* Edn. XIX., p. 891. At least 24 deaths are recorded. 3 deaths at Wembley.—L. i./29,795,846.

Recent Refs.:—B.M.J. i./28,659; L. i./29, 1105; B.M.J. i./30,589; Toxicology. Use not justified.—L. ii./30,1340. A girl bedridden with paralysis from it.—M.P.C., Dec. 10, '30; Interdicted.—Bd. of Education, B.M.J. i./31, 373,473. Deleterious later effects—*ibid.* 575. Toxic symptoms, 3 cases out of 101.—L. ii./31,913. After-results at St. George's Hospital, not encouraging. Anything but epilation by X-Ray treatment is a waste of time.—L. Haden Guest, B.M.J. i./32,261.

Thallium Sulphate mixed with grain (1 in 1,000) useful to kill wild rats in the Hawaian Islands.—P.J. ii./31,228.

Thebaine Hydrochloride Ph. Ned. V. $C_{19}H_{21}NO_3.HCl.\frac{1}{2}H_2O = 356{\cdot}6444$. *Dose.*—½ to 1 grain *per os* increased with care, Hypodermically $\frac{1}{10}$ grain. The salt of an alkaloid of Opium, soluble about 1 in 15 of water. Has been used in neuralgic affections.

Thuja Occidentalis.—Arbor Vitæ. A Tincture is prepared, of the dried young tops in 10 of 70% alcohol. *Dose.*—2 to 5 minims (0·12 to 0·3 Cc.). Thuja has an irritating action on the skin, and has been employed to remove warts and fungoid granulations from ulcers; internally for amenorrhœa, pulmonary catarrh, and worms. ✱ Ecthol (T.M. 224,575). *Dose.*—1 drachm well diluted. Is said to contain *Thuja occidentalis* and *Echinacea angustifolia*. Employed in all forms of septic conditions, *e.g.*, typhoid, erysipelas, diphtheria, acne, etc., also locally for any kind of pustular formation; as wound dressing diluted with 2 to 10 times volume of boiled water.

Thymus Vulgaris (*Labiatæ*). Thyme. Extractum Thymi Liquidum P. Helv. 1=1 *Dose.*—5 to 30 minims. *Flavoring.*—Syl or Glyl Pini, or Lavandulæ, Syrupus Aurantii. Pertussin, a proprietary article for whooping cough, contains this drug. *Dose.*—1 to 4 drachms repeated. Syrupus Thymi (Ph. Notes). Liquid Extract of Thyme, 1 Syrup 7 has similar properties and dose. Ⓡ With a small dose of Diamorphine a virtual specific for hacking cough. The following are two useful mild sedative preparations for cough: Ⓟ Ⓡ Linctus Thymi et Diaphorm. *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain, Syrup of Thyme to 1 drachm. Ⓟ Ⓡ Elixir Thymi de Diaphorm. *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain Compound Tincture of Lavender 15 minims, Syrup of Thyme to 1 drachm.

Oleum Thymi. *Dose.*—3 minims. Distilled from the fresh herb—*cf.* Origanum Majorana. It contains 25% Phenols (Thymol and Carvacrol).

"Red" Thyme Oil on rectifying is converted into White Thyme Oil. To prevent this turning red again it is frequently distilled with a large amount of Turpentine, or indeed the white variety is simply a dilution with Turpentine.

Oil of Red Thyme is obtained from the fresh herb, Thymus Vulgaris and other vars. in Southern France. Spanish Thyme Oil is probably derived from a species of Origanum.

Tragopogon Pratense (*Compositæ*). 'Goat's Beard.'—Poisoning by seed of, called 'Gipsy Nuts,' has occurred. Give Emetic: Strychnine *hypod.*

Ulmus fulva (*Ulmaceæ*).—The SLIPPERY ELM, U.S. X. (*Ulmus campestris* is common in Europe). The inner bark of fibrous texture has a highly mucilaginous taste; in powder is much used as a demulcent. It should be free from starch. Ten grains shaken with an ounce of water should form a thick jelly-like fawn coloured mass. *Decoction*—1 in 8. *Dose.*—2 to 4 ounces. A mucilage 1 in 16⅔ was Official in U.S. VIII. Glycogelatin Pastils are prepared containing 2 grains.

Urginea.—Indian Squill. *U. indica* and *Scilla indica* are *B.P.* '14 and preparations Acetum, Pilula Ipecacuanhæ cum Urginea, Pilula Composita, Oxymel Urgineæ, Syrupus and Tinctura correspond with Squill preparations for use in the Tropics.

Vanadium (V=50·95).—Meta-Vanadic Acid, HVO_3=99·9578 and Sodium Meta-Vandate, $NaVO_3$=121·947. Of these the last has been used in chlorosis, phthisis, and rheumatism as tonics and antiseptic. *Dose.*—1/32 grain or 1/5 the quantity injected hypodermically. Soluble in water, 2 in 1; decomposes in the presence of organic matter. Vanadine.—A liquid preparation of French manufacture, said to contain a vanadium salt and sodium chloride. Is used for gastralgia and dyspepsia.

Vanillin. U.S.X. Methylprotocatechuic Aldehyde. $C_6H_3OH.OCH_3.COH$. 4 : 3 : 1=150·0624. Occurs in white acicular crystals, having a strong odour if obtained from *Vanilla planifolia* (*Orchidaceæ*) (the cured full-grown but immature fruit), but is mostly made synthetically from guaiacol or from eugenol or from coniferine, a glucoside obtained from coniferous woods. Soluble in alcohol, ether, and oils, sparingly so in water. Use suggested in atonic dyspepsia as an excito-motor stimulant. For employment as test, *vide Vol. II.* Solutio Vanillin.—Vanillin 80 grains, Alcohol 90% to 1 ounce. For ordinary purposes ½ drachm will flavour a pint of medicine. Essence of Vanilla 1 in 8 by macerating Vanilla Beans 1 finely ground with Sand 1, in a mixture of Water 2, and Alcohol 90% 6. From this are prepared Glyl and Syl Vanillæ *q.v.*

Elixir Vanillini Compositum: N.F. *Dose.*—½ to 1 drachm. Mix Compound Spirit of Vanillin 20, with Alcohol 80, add Glycerin 25, then Syrup

300 and Water 550 in several portions with shaking. Then Tincture of Caramel 20 (Caramel 1, Alcohol 2·5, Water to 10). Finally Water to 1000. Filter with Kieselguhr.

Spiritus Vanillini Compositus : N.F. V. *Dose.*—½ to 1 drachm. Vanillin 40, Oil of Orange 10, Oil of Cardamom 2, Oil of Cinnamon 1, are dissolved in a sufficiency of Alcohol to make 200.

℗1 Veratrina (*B.P.* 1898). Ph. Ned. V. *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain. A mixture of alkaloids, chiefly amorphous veratrine and crystalline Cevadine, from Cevadilla seeds—*Schœnocaulon* (*Asagræa*) *officinale* (*Liliaceæ*)—in greyish white masses, taste, bitter and acrid. Nearly insoluble in water; *soluble* 1 in 3 of 90% alcohol; 1 in 6 of ether. It is used as an antipyretic *with caution*, and circulatory sedative in fevers and acute inflammations—resembles Aconitine in its general effects. Large doses cause vomiting and purging; sometimes for neuralgia, spasm, rheumatism and gout. Externally in the form of ointment for neuralgic pains and swellings.

Caution. Its sternutatory properties are most marked.

℗ Oleatum Veratrinæ Veratrine 2, Oleic Acid (by weight) 50, Olive Oil to 100. Useful for neuralgia. Stronger, *e.g.* 10% is employed as a pigment.

℗ Unguentum Veratrinæ (*B.P.*, '98). Veratrine 1, Oleic Acid (by weight) 4 (1 grain=2 drops); warm gently to dissolve, add Lard 45. Prolonged use may produce rash. Useful for neuralgia and sciatica, rubbed in twice daily.

℗ Acetum Cevadillæ. E. Cevadilla Seeds crushed 10, Methylated Spirit 10, Acetic Acid 18, Water 72. Macerate 7 days. P.G. VI is also 10%. For external use.

Veratine in poliomyelitis.—P.J. ii./31,343.

Veratri Viridis Rhizoma.—GREEN HELLEBORE RHIZOME. *Dose*, in powder.—1 to 5 grains.

The dried rhizome and rootlets of *Veratrum viride* (*Liliaceæ*), imported from and official in U.S. It contains protoveratrine and other alkaloids. Its powder excites sneezing. V. *Album* is similar. A powerful Cardiac, arterial, and nervous sedative In puerperal eclampsia small doses hypodermically said to be of value, giving chloroform until the veratrum takes effect.

Tinctura 1 in 10 of 90%.—*B.P.* '85, 1 in 5. *Dose.*—5 to 15 minims.

Veratrone.—A proprietary preparation, 1 Cc. of which is equivalent to 20 minims of tincture. In eclampsia.

The rhizome of *V. album* (*Liliaceæ*) *White Hellebore*, emetic, purgative and parasiticide, contains alkaloids. Similar to those of *V. Viride.*

Both the preceding must be distinguished from Helleborus Niger (*Ranunculaceæ*), or Christmas Rose, which is purgative and emmenagogue and has strong sternutatory properties, and is now little used.

H. Niger and *H. Viride*—a comparative study. It is not possible at present to find any character enabling one to distinguish with certainty between these rhizomes and roots.—T. E. Wallis and A. M. Saunders, P.J. ii./24,90.

Verbascum Thapsus P. Dan. Great Mullein (*Scrophulariaceæ*). Has been used in phthisis; has anodyne demulcent and diuretic properties. Tincture 1 in 8, Alcohol 60%. *Dose.*—20 to 60 minims.

Verbena Officinalis.—Vervain. Has been used as a remedy for epilepsy.

✱ Vescettes. (T.M. 260597). Effervescent Salts in compressed form. To be crushed and added to a small quantity of water preferably warm. For various formulæ *see* Index.

Viburnum Opulus.—Used as antispasmodic as a Decoction—½ ounce in 1 pint of water. *Dose.*—A tablespoonful to a wineglassful. It was accidentally discovered that all the commercial supplies of 'Viburnum opulus' bark consisted of the bark of *Acer Spi atum*, which has no known effects on the animal system—they have strong resemblance in appearance. A totally inactive preparation had been used for years.—H. H. Rusby, P.J. ii./29,313.

Viburnum.—BLACK HAW (*B.P.* '14). Ph. Ned. V. Bark of *V. prunifolium* (*Caprifoliaceæ*). Antispasmodic, diuretic, nervine tonic. For dysmenorrhœa and threatened abortion. Extractum Liquidum (*B.P.* '14). *Dose.*—1 to 2 drachms. 1=1 Alcohol 70%. Tincture 1 in 20 Alcohol 60%. *Dose.*—2 to 4 drachms. Elixir Viburni prunifolii, B.P.C. Liquid Extract 12·5 Compound Tincture of Cardamoms 7·5, Aromatic Elixir to 100. Compound Elixir, B.P.C. is Liquid Extract of Viburnum 50, Dry Extract of Hydrastis 1·75, Oil of Coriander 0·5, Oil of Caraway 0·5, Glycerin to 100.

Vinca major—Great Periwinkle Herb. Is astringent, and has been used

for menorrhagia. Infusion, 1 in 10. *Dose.*—A wineglassful frequently. Liquid extract, 1 to 2 drachms.

Viola Odorata.—Has been used in cancer both internally and externally as a **Liquid Extract** (2=1 of fresh leaves). *Dose.*—Internally, 1 drachm and **Liquor Violæ Glucosidi.** *Dose.*—½ ounce thrice daily.

Syrupus Violæ.—Macerate fresh *flowers* 2 in alcohol 90% 1, 8 hours, press and add water to 2, filter and add syrup 18, used as flavoring.

Ionone.—Artificial violet perfume made by action of alkalis on a mixture of Citral and Acetone in presence of water. It has composition $C_{13}H_{20}O$, and is an oily liquid with Sp. Gr. 0·935. It contains *a*-ionone (Sp. Gr. 0·932) having the sweeter odour, resembling Orris, and *b*-ionone (Sp. Gr. 0·946) which more resembles the fresh violet flower. Synthesis of Ionone.—P.J. ii./29,289.

Ionone is better blended and matured a month with other perfumes, *e.g.* Ionone 57½, Bergamot Oil 17½, Terpineol 14, Heliotropin 9, Benzyl Acetate 3½, Musk-Xylol 3½. About 0·5 to 0·6% of this blend for face creams.—P.J. i./30,4.

Viola Tricolor.—Flowering plant of Wild Pansy. Is stated to contain Glucosides similar to *V. odorata*, also Salicylic Acid. Is used externally as an ointment, and a poultice. *Dose.*—10 to 60 grains in infusion. An infusion in milk 1 in 10, useful in acne vulgaris.

Viscum album.—Mistletoe (*Loranthaceæ*). The berries are said to be emetic and purgative. The plant contains Viscin, a kind of birdlime—Japanese Birdlime, which has been used as a plaster and is largely employed for making sticky fly-papers. Has been given for epilepsy and hysteria. *Dose*, in powder 10 to 60 grains. Recommended for chorea.—W. W. W. Liquid Extract 1=1. *Dose.*—15 to 60 minims.

Hyperpiesia treated by extract of viscum injections intramuscularly (5 centigrammes night and morning) and *per os* in pills (15 centigrammes night and morning).—B.M.J.E. ii./26,17.

In albuminuria said to be of value. Solid extract used, 0·1 to 0·3 Gm. per diem; acting best when blood pressure and tension is high.

✱**Guipsine** (T.M. 310351) **Pills** stated to contain 0·05 Gm. of active principles of this drug. Fresh mistletoe contains a volatile alkaloid and two saponins and emetic and cathartic resin. Guipsine is stated to contain all these excepting the resins. It lowers arterial tension due to a central vaso-motor action, and is without any depressing action on the heart itself. For use in arterio-sclerosis.

Xanthoxylum.—Dried bark of *Xanthoxylum Americanum* (Miller), Northern Prickly Ash; or of *X. Clava-Herculis* (Linné), small (Southern) Prickly Ash (*N.O., Rutaceæ*), Fluidextractum. U.S. IX. 1=1. *Average dose.*—30 minims. Hydro-alcoholic. Stimulant, employed in rheumatism.

For further varieties of Xanthoxylum, *see* Edn. XVIII, p. 867.

Xysmalobium.—A bitter crystalline glucoside (0·3%) from the root of *Xysmalobium undulatum* (*N.O. Asclepiadaceæ*), R.Br., a South African native remedy for dysentery and as a bitter tonic. Toxic and has Digitalis-like action.—J. M. Watt, Jl. Ph. & Exp. Therap., Mar.,'30,261. Isolation of Glucoside.—Trans. Roy. Soc. S.A., 1927,XIV.,353.

Yagé. A note on.—E. M. Holmes, P.J. ii./27,111. *See also* Y.B.P. '27,267.

Yerba Santa (*Eriodictyon glutinosum* or *E. californicum*).—Leaves are aromatic and sweetish, often agglutinated together; they are stimulant in bronchitis, phthisis, and other catarrhal affections. Fluid extract, 10 to 40 minims. *E. californicum* is Official in U.S. **Fluid Extract** 1=1. *Average dose*, 15 minims. Contains crystalline Eriodictionone $C_{15}H_7O(OCH_3).(OH)$.

℗ **Yohimbine Hydrochloride**, $C_{21}H_{26}O_3N_2.HCl$. P.G. VI. The salt of an alkaloid (M. pt. 234° C.) obtained from Yohimbe bark by extraction with Acetic Acid, precipitating c. Sod. Carb. and recrystallising from alcohol. *Pausinystalia Yohimba* (*Rubiaceæ*) is a reputed aphrodisiac 1% solution in Alcohol. *Dose.*—5 to 15 minims. Yohimbe is used by the Cameroon natives.

℗ **Tablets** contain $\frac{1}{13}$ grain. *Dose.*—1 thrice daily; may be increased to five. (Avoid excess.) It has erotic powers. If the internal administration not successful, injections of 7 to 15 minims (½ to 1 Cc.) of a 1% solution may be tried.

A few drops of a solution ½ to 1% strength act as an anæsthetic when applied to the cornea.

True Yohimbe bark contains at least 4 alkaloids totalling 0·3 to 1·5%. History, botanical sources, chemistry, tests and characters of Yohimbe.—Prof. J. Small, P.J. i./22,283,311 ; Y.B.P., '27,56-59 ; P.J. ii./25,17.

Zingiber (*B.P.* '14). Dried rhizome (scraped) of *Z. officinale* (*Scitaminaceæ*). *Dose.*—5 to 15 grains. Must yield 5% to Alcohol and 8·5% to Water. P.G. VI. has the rhizome not scraped. **Fluidextract.** U.S. 1=1, alcoholic. *Dose.*—8 minims. **Syrup** (*B.P.* '14). *Dose.*—½ to 1 drachm. Ginger 1, Alcohol 90% *q.s.* to 2 by percolation, add Syrup *q.s.* to 40. **Pulvis Aromaticus U.S. IX.** *Dose.*—15 grains, Saigon Cinnamon 35, Ginger 35, Cardamom 15, Nutmeg 15. **Tinctura Carminativa,** B.P.C. *Dose.*—2 to 10 minims. Essence of Ginger 6·25 (*B.P.* 1885), Cardamom Seeds, bruised, 6·85, Oil of Cinnamon, Oil of Caraway and Oil of Clove of each 1·04. Macerate the Cardamoms in Alcohol (90%) 75 for a week, decant, express, and dissolve the oils in the mixed tinctures, adding Alcohol (90%) *q.s.* to 100.

Tinctura Zingiberis Fortior, Essence of Ginger, B.P. 1885. Ginger 1, in Alcohol (90%) 2. *Dose.*—5 to 20 minims. **Tinctura Zingiberis** (*B.P.* '14). *Dose.*—30 to 60 minims. 1 in 10 Alcohol 90%.

Gingerin. *Dose.*—¼ to 1 grain. The treacle-like oleo-resin of ginger made by percolation with ether or acetone and subsequent evaporation. Added to purgative pills to prevent griping. **Gingerol** of Grier confirmed by A. Lapworth. It has been converted into a crystalline derivative and further broken down by the latter investigator into a crystalline pungent principle. Finally gingerol has been synthetised on these lines.—P.J. i./17,201. See also ii./17,172,205. **'Hippocras'** *Dose.*—As required, Ginger, Cloves, Mace, Nutmeg, Galangal, of each 1 drachm, Cinnamon 2 ounces, White Wine 1½ gallons, Sugar 40 ounces, Digest 3 days. Stomachic and antispasmodic.—From an old herbal.

Mistura Carminativa. *Dose.*—½ ounce (15 Cc.). Tincture of Ginger 3 drachms, Compound Tincture of Cardamoms 9 drachms, Tincture of Capsicum 1 drachm, Spirit of Ether 3 drachms, Spirit of Chloroform 1½ drachms, Peppermint Water to 6 ounces. A dose every 2 or 3 hours useful in dyspepsia.—Sir W. H. Willcox.

Ginger cultivation in Jamaica.—P.J. i./26,324.

Research by the Imperial Institute has resulted in a high-grade Ginger available from Nigeria equal in all respects to best Jamaica.—Imp. Inst. Rept. 1930.

Notes on Ginger.—H. S. Redgrove, P.J. ii./30,54.

VACCINES AND ANTITOXINS.

Vaccine Therapy may be defined as—"to exploit in the interest of infected tissues, the unexercised immunising capacities of the uninfected tissues"—in other words, to stimulate the chemical machinery of the patient to elaborate the required specifically bacterio-tropic substances. In some infections, *e.g.* furunculosis and other staphylococcal infections, and in bronchitis and other infections of the respiratory tract due to the pneumococcus, the results have been striking. In many other diseases, such as typhoid fever, gonococcal infections, septicæmia and endocarditis, encouraging observations are on record. Vaccines have given valuable results in the prophylaxis of disease.

With regard to the **Antitoxin Treatment** Behring showed that the toxins of the diphtheria bacillus when injected into a suitable animal effected an immunity, that the serum of this animal gave protection against the disease when injected into another, and that it could be employed for treating the disease in the human body.

The antitoxins contained in this animal blood serum combine with the toxins in the blood and tissues of the sick person; by so doing they *neutralise the power of the toxins*, and thus he recuperates.

The Toxins of diphtheria and tetanus are extra-cellular "soluble" toxins excreted by the bacteria, found in the fluids in which they are cultivated. But in the case of typhoid and plague, the toxins are apparently inherent in the bacterial cell; and anti-endotoxins are not readily produced.

Antibody is a substance found in the blood serum, resulting from the inoculation into the animal of a foreign *protein* termed its *antigen*. Thus, if a foreign protein, *e.g.*, egg albumen be injected, the blood serum acquires a new property, that of precipitating a solution of egg albumen, such as was used for the injection. Here the albumen is the antigen and the new property is assumed to be due to a new substance—an antibody called *precipitin*. Antibodies are always *specific*, for example, diphtheria toxin acting as an antigen leads to the production of diphtheria antitoxin which has no action on the toxin of tetanus. Antibodies may be classified according to effect produced on combining with corresponding antigen, thus :—

Antibody.	Antigen.	Action.
Antitoxin	Toxin	... Neutralisation.
Precipitin	Coagulable Protein	... Precipitation.
Agglutinin	Cells, bacteria, etc.	... Clumping.
Cytolysin (including Bacteriolysin and Hæmolysin).	Cells, bacteria, etc.	... Prepares cells, bacteria, etc. for solution by complement.
Opsonin	Cells, bacteria, etc.	... Prepares cells, bacteria, etc. for ingestion by phagocytes.

It is not certain that opsonin should be classed as an antibody. Possibly all the true antibodies play the part of an opsonin.

Two substances are required for the lysis of the microbe—the so-called *immune body* produced during the injection treatment—the other known as the *complement* exists already in Normal Serum and is not elaborated in increased quantities by the injections. The immune body is supposed to possess two affinities, one of which binds it to the bacterium and the other satisfies itself by combining with the complement. The possession of this double affinity of the bacteriolysin is recognised in its name of amboceptor. It must be regarded as an intermediary body which on being added to the bacteria during the process of immunisation gives the complement, existing already in the blood serum the power of attacking them. The complement—not the immune body, destroys the bacteria.

In antitoxin treatment, a serum which already contains the antitoxin is introduced into the patient's circulation and this has the power of uniting with the toxin to form an inert substance. Contrast this with *Vaccine* treatment wherein the tissues of the body are stimulated to form the necessary antibodies for themselves.

Immunity may be (1) *Natural* where the organism is naturally insusceptible to the infection; (2) *Acquired* (*a*) developed as result

of recovery from infective disease, or by artificial introduction of gradually increased doses of bacteria or toxin—this is *active immunity*; (*b*) produced by introducing an antibody to the infecting substance in the shape of animal serum previously immunised,—this is *temporary* or *passive immunity*. When a person is exposed to infective disease there may be natural immunity, or he may acquire same and develop power to resist the poison. On recovery, immunity will persist for a longer or shorter time rendering him less liable to contract the disease again. In the future, antibodies may possibly be increased in the organism by methods other than the injection of dead bacilli.

The old theory of specific antibody formation is giving way to the idea of specific antibodies as retained biochemical derivatives of injected antigens—rendering possible the test-tube duplication of antibody production. Diphtheria toxin exposed to a large excess of Trypsin is claimed to act as a specific diphtheria antitoxin.—Jl. A.M.A. ii./29,1387.

Immunity Reaction consists essentially in the exercise of certain capacities of *defence* on the part of the body cells in response to the exercise of certain capacities of *offence* on the part of bacilli, cocci or protozoa, which cause the disease.

Certain practical aspects of immunity.—R. A. O'Brien, B.M.A., 1927, B.M.J. ii./27,975. Biological principles in immunity, *ibid.* 978.

Local immunity in infectious diseases.

Besredka claims that certain tissues have a very low resistance for certain bacteria, though the other tissues may be able to deal with them easily. Hence, he argues, if the weak tissues be immunised the whole animal becomes immune to the infective organism. Thus he claims that the skin is the weak spot in the case of anthrax, staphylococcic, etc., injections, and the gut wall in typhoid, dysentery, etc. If these are immunised by local treatment then the animal becomes immune. He also says this is not accompanied by the formation of antibodies in the circulation.

A large number of cases of infections localised in the skin or in the bone have been treated with antibacterial dressings. In the majority of cases the filtrate of the broth culture was employed. Furunculosis, boils, osteitis, osteomyelitis and various infections, were treated with success. (This is supposed to justify the theory that vaccine therapy should be based not on antibody production, but by direct vaccination of the receptive cell, but unfortunately similar results can be obtained with plain broth.)

According to the conception of Besredka, vaccine therapy aims less at curing the diseased cells, but more to protecting those cells which are still well. In order to employ the vaccine in a rational manner, it should be applied to the region of the receptive cells.—Abstract of paper by Prof. Besredka, read by H. Plotz before the Roy. Soc. Trop. Med. Trans., Vol. 17, Jan. '24.

A study of the use of dysentery vaccine *per os* was undertaken by the Medical Section of the League of Nations, and comprised the vaccination of 29,880 refugees in camps in Greece. As a result not one person contracted the disease, and in those regions where dysentery was epidemic this method of vaccination had completely stopped the epidemics.

Bacteria injected into the stomach are destroyed. Organisms so injected are never found at a higher level than the point where introduced. Gastric juice and intestinal mucous membrane are good barriers against the passage of bacteria into the body. Bacteria taken into the mouth may be absorbed

through the buccal and pharyngeal mucous membrane. Bacteria introduced into the body by any route are always excreted into the intestinal tract.—Teale and Embleton, B.M.J. i./22,437.

Gratia repeated Besredka's experiments and finds that though his facts are partly correct his explanation is very doubtful. He considers the most likely interpretation is that when the bacilli are injected into the skin they are able to multiply and give off their toxic properties, to which the animal reacts by forming immune bodies. Besredka's hypothesis of local immunity is not in agreement with observed fact.—A. Gratia, per B.M.J.E. ii./24,72.

Antiviruses are substances of microbic origin capable of local vaccination without the introduction of antibodies. They are selective in their action and affect only a certain group of cells known as 'receptives,' *e.g.*, the staphylococcus vaccine has a selective affinity for cells of the skin and certain mucous membranes. Oral vaccination against typhoid is now taking its place in ordinary practice. *Antivirus dressings* soaked with filtered cultures in bouillon (or a mixture of Lanolin and Vaseline incorporating the antivirus) left in place for 24 hours are being successfully used in a variety of staphylococcal and streptococcal infections, and in many ocular affections, *e.g.* blepharitis, conjunctivitis, ulceration of the cornea, and keratitis.—Prof. Besredka, Proc. R.S.M., Oct. 1929, per M.A. '31,393. *See also* B.M.J.: i./2 1020 ; E. C. Plummer, *ibid.* ii./27,46.

Antivirus Therapy. Besredka's idea that cuti-immunity can be produced by applying cultures of the organisms to the skin, or by using broth filtrates. Inhibitory power non-specific, but therapy a specific.—R. F. Hunwicke P.J. ii./30,359 ; L. ii./29,771.

Anti-virus results in this country not the same as on the Continent.—B.M.J. ii./30,142.

Digestibility of Bacteria. Although of nitrogenous base, bacterial cells are not digested by powerful proteolytic ferments. They can live and multiply in solutions which split up proteins of which by chemical analysis they have been shown to be composed—hence their vitality in the intestinal tract. Digestion and adsorption experiments. Their lipoidal envelopes protect them.—C. E. Dukes, B.M.J. i./22,430.

Bacteriophage.—F. W. Twort in 1915 described the fundamental character of the filter-passing lysin—or virus—associated with different bacteria. It was shown that it infected bacteria and could be transmitted from culture to culture. Two years later d'Herelle, of the Pasteur Institute, gave the name 'bacteriophage' to the contagious filter-passing material causing bacterial lysis.—L. i./25,845.

d'Herelle says that the bacteriophage is a living corpuscular element independent of the lysed bacteria, which displays vital properties of assimilation and adaptation.—Comptes Rend., per Jl. A.M.A. ii./25,1337.

The bacteriophage is not a living virus but a lytic substance produced by the bacteria themselves.—J. Bordet, Ann. de l'Instit. Pasteur, Sept. '25 per Jl. A.M.A. ii./25,1675.

The bacteriophage can only be propagated in living bacterial cultures and is a product of bacterial growth rather than of bacterial disintegration.

Action of Bacteriophage upon Bacteria may be summed up as follows: Exposed to the action of bacteriophage many bacteria become phagogenic: grown in presence of bacteriophage the virulence of many organisms is altered: the cultural properties of the bacteria and the character of solid colonies may also be altered ; the antigenic properties of bacteria may be modified by the bacteriophage and the bacteria are killed and lysed. Organisms most sensitive to the bacteriophage are members of the typhoid-dysentery-colon group: less susceptible organisms including diphtheria bacillus, plague bacillus, the bacillus of hæmorrhagic septicæmia, staphylococci, streptococci and the cholera vibrio. Variation in virulence is a marked characteristic. It is extremely stable to heat and chemical reagents. Also possesses antigenic powers and various antibodies can be obtained by appropriate manipulation. While d'Herelle holds it is an ultra-microscopic living organism capable of preying on living bacteria, others hold that it is a ferment or catalytic agent and Kateshima suggests name 'Ferment d'immunité bacteriolysant.'—Jl. Trop. Med., Sept. 15, '26,323.

The bacteriophage is thought to be a living organism, and the contention is supported by the action on it of various antiseptics such as Mercuric Chloride, Phenol and Chloramine, to the deleterious influence of which the bacteriophage can be accustomed. The nature of the bacteriophage. C. Prauznitz, L. ii./27, 535, *ibid.* 559.

Results with the specific bacteriophage in staphylococcal and other infections. —B.M.J.E. ii./26,100.

A purified bacteriophage a billion times richer in lytic particles than the original, but less stable, made by Krueger and Tamada.—Jl. A.M.A. ii./29,1735.

Ultramicroscopic filter-passing bacteriolytic agents represented by bacteriophage of d'Herelle. Nature, conditions favouring bacteriolysis, culture media, and properties.—F. W. Twort, L. ii./30,1064.

Polyvalent bacteriophage.—L. ii./29,621.

d'Herelle's views on immunity. Many disagree with him profoundly.—B.M.J. ii./30,563. Bacteriophage theories.—L. i./31,79.

Cholera treated by bacteriophage. Results highly favourable. Ind. Med. Res. Memoirs reviewed.—L. ii./30,647.

Bacteriophagy is a general phenomenon possibly involving all bacteria.—d'Herelle, Can. M.A.J., May '31, per Jl. A.M.A. ii./31,448.

Of 41 cholera patients treated with bacteriophage 7·3% died; out of 107 untreated with bacteriophage 65·4% died. Intravenous saline injections helpful in prolonging life and giving bacteriophages time to attain exaltation in virulence.—B.M.J. i./28,365.

Bacillary dysentery. In general very satisfactory.—J. London, I.M.G., July, '30, per M.A. '13 159.

A number of further (earlier) abstracts in Edn. XVIII., p. 873.

Anti-Sera are made as **Polyvalent** as possible, *i.e.*, many strains of the bacterium are employed for inoculation.

In the **preparation of Anti-toxin** the toxin is injected subcutaneously into the animal, *e.g.*, the horse, with strict aseptic precautions. The toxin is usually at first mixed with anti-toxin or the animal has a large protective dose of anti-toxin given before the inoculation is started. Some reaction, rise in temperature and malaise occur. Further injections are made at intervals. The quantity injected is gradually increased, and subsequently the injections may be intravenous. The blood is removed from the animal by the aid of a large sterilised canula, from the jugular vein, 6 to 12 litres may be collected in sterile flasks. The clot is allowed to form by standing 24 to 48 hours, and the serum is decanted into sterile bottles after the addition, by some manufacturers, of 0·3% of Trikresol or 0·2% of Phenol.

Some of the disadvantages of Serum Therapy.—Certain types of bacteria, *e.g.*, the *Streptococci* and *B. Coli* are only general names for very numerous families, and the antibodies efficient against one member may be altogether without effect on another member of the family. Polyvalent sera have been attended with some success but many failures may still be ascribed to this difficulty. Further, the added immunity in the use of a serum is limited in kind and extent. They may be deficient in certain necessary properties, *e.g.*, may not be sufficiently anti-endotoxic, etc. Again, the Serum may render the patient hypersensitive to future injections of serum from that animal from which the antiserum was prepared. To guard against this it is necessary to inquire before use whether and when the patient has been previously treated with an antiserum.

Coming now to the more detailed consideration of **Vaccines** th following table, giving approximate initial doses for treatment and for prophylaxis in the adult, which we have arranged, should b useful for reference :—

Table of Vaccines.

Arranged alphabetically.

Vaccine.	Prophylactic dose. Initial.	Prophylactic dose. Final.	Therapeutic dose. Initial.	Therapeutic dose. Final.
Acne Bacillus ...	Not used.		5 mill.	500 mill
Actinomycosis ...		,,	5 ,,	100 ,,
			or 0·001 mgr.	0·02 mg
Cholera	500 mill.	2000 mill.	Not used.	
B. Coli	100 ,,	2000 ,,	5 mill.	500 mil
Combined for Colds	100 ,,	1000 ,,	50 ,,	1000 ,,
B. Dysenteriæ ...	500 ,,	2000 ,,	5 ,,	1000 ,,
Gonococcus ...	Not used.		25 ,,	1000 ,,
Hay Fever	25 units	1000 units	25 units	500 uni
B. Influenzæ ...	100 mill.	2000 mill.	10 mill.	2000 mil
M. Catarrhalis ...	250 ,,	2000 ,,	10 ,,	1000 ,,
M. Melitensis ...	1000 ,,	2000 ,,	50 ,,	1000 ,,
Meningococcus ...	Not used.		50 ,,	2000 ,,
B. Pestis	500 mill.	1000 mill.	50 ,,	1000 ,,
Pneumococcus ...	250 ,,	2000 ,,	10 ,,	2000 ,,
Staphylococcus ...	Not used.		100 ,,	1000 ,,
Streptococcus ...	250 mill.	2000 ,,	5 ,,	1000 ,,
Strepto. Rheumaticus	Not used.		5 ,,	1000 ,,
Tuberculin. A.F. ...		,,	0·00001 Cc. upwards	
,, **B.E.** ...		,,	0·00001 Cc. upwards	
,, **T.R.** ...		,,	0·00001 Cc. upwards	
Tuberculins, Various, see Tuberculin Chapter.				
B. Typhosus (and **B. Paratyphosus**)	500 mill.	2000 mill.	50 mill.	1000 mil
B. Whooping Cough	500 ,,	2000 ,,	5 ,,	2000 ,,

In ***Prophylaxis*** the above doses are suitable in the majorit of cases. The **Intervals between doses** should never be less tha 7 days and may be extended to 14 days with advantage.

In ***Treatment*** as regards dose it is a safe rule to follow that th more acute the infection and the more 'toxic' the patient th smaller the initial dose. The doses above stated are sufficientl small except possibly in severe generalised infections with marke toxæmia in which perhaps the dose may be halved. As regard ***Intervals*** there is no general rule but the smaller the dose th shorter should be the interval between doses. Thus in septicæmi cases where minimal doses are employed these may be required dail or every other day. Clinical signs, the focal and general reaction afford the necessary guidance.

Combined Vaccines. The simultaneous use of a combination c organisms does not entail reduction in doses of the constituents.

Doses for Children:—

Under 3 years. 1/5 adult dose.
From 3–7 years. 1/4 adult dose.
From 7–10 years. 1/3 adult dos
From 10–14 years. 1/2 adult dos

Varieties of Vaccines.

The following are in use.

(1) The ordinary type of vaccine which is a suspension (emulsion of the killed or attenuated bacteria in Normal Saline with, as a rul ½% Phenol or Trikresol as antiseptic.

(According to the *Therapeutic Substances Act*, 1925, the nature an

the percentage proportion of antiseptic substance must be stated on the label—subsequent to Feb. 6, 1928.) *See also Therap. Subs. Act.*

(2) ✱**Detoxicated Vaccines** (T.M. 392346). Thomson evolved the idea of treating bacteria, *e.g.*, the gonococcus, with an alkaline solvent, whereby the stroma or bacterial protoplasm and the toxic endotoxin are dissolved. On treatment with acid or acid salt the stroma is again precipitated, the idea being that the toxin is in the solution—the latter is rejected and the bacterial substance, after washing and suspending in slightly acid medium, is used therapeutically. (*See* L. i./19,374,1102,1123 ; i./21,795,849.)

(3) The toxic products of the bacterial growth, either *e.g.*, as in the case of Mallein in an albuminous medium, or as in Tuberculin "A.F." in a medium which is protein-free. The former clearly contain the products of metabolism of the protein-containing medium, while the latter contains only the toxic excretions of the bacilli and small amounts of endotoxin liberated by autolysis.

Preparation and Standardisation of Vaccines :—

A Vaccine is best prepared from the organism isolated from the patient, but in case of *B. Tuberculosis* this is not essential, and there are many obstacles in the way in other diseases, *e.g.*, in the case of *Gonococcus* it may be difficult to secure a pure culture, and the loss of time may be of immense importance. In the case of tubercle a stock Tuberculin is used while a special one is being prepared from the case.

The organisms are then devitalised by a temperature of 60° C. for 1 hour, and the Vaccines introduced into ½ and 1 Cc. tubes. Preservative, *e.g.*, Trikresol or Carbolic Acid as mentioned, is added. The vaccine is standardised by direct counting, comparison with various standard tubes or by the opacity method of Gordon.

Standardisation of Vaccines—a note on the McFarland, compared with the Brown and Kirwan methods.—Maj. H. C. Brown, L. ii./25,941,995.

The theory of **Immunisation** depends on the human being having a sufficiency of anti-bacterial substances to kill off the infecting organism. If the latter gains access and colonisation begins, the destruction of a portion of the invaders strengthens the defence.

The bacterial invasion, if not too large, may as the result of the destruction of a few of the bacteria in question, lead to self immunisation and recovery, and the introduction of a bacterial vaccine may form the turning point, producing, as it does, the reinforcement of the defending forces that was necessary.

General References to Vaccine Therapy.

Eye Work.—Correct diagnosis essential. *Ophthalmia neonatorum* depends on infection of several organisms—the Gonococcus, Streptococcus, Staphylococcus and others. In Vaccine Therapy, by imitating nature, antibodies are created at the site of injection, distant from the original infection, and these circulating in the blood stream exert a beneficial effect on the distant lesion. Tuberculin, Staphylococcic and Streptococcic Vaccines, as also Gonococcic Vaccines, have proved themselves of value in eye work.—J. W. H. Eyre, B.M.J. ii./10,1310.

A questionnaire answered by 1261 physicians showed ***only 17 thought*** Vaccine Therapy ***generally useful*** for treating infections diseases ; 140

reported harm from stock vaccines; and 17 cases of asthma followed use of vaccines in patients hitherto immune.—L. Hektoen and E. E. Irons, Jl. A.M.A. i./29,868.

Vaccines compared with antiseptics. The antiseptic method was largely employed in the war, but it made the wounds no better—every microbe multiplied. Staphylococci and streptococci remained behind after perpetual irrigations with Hypochlorite. Government might with advantage forbid antiseptics. Optochin, though it will kill pneumococcus in 1 in 400,000 dilution in serum, did not give striking results in practice. Flavine, though not killing the white corpuscles instantaneously, does so on slight 'cooking.' The Profession is therefore thrown back on Vaccine Therapy. Vaccine Therapy should be used in incipient and localised infections and in septic wounds.—Sir A. Wright, B.M.J. ii./30,735; L. ii./30,960. In conditions in which the body is sensitised, *e.g.*, exophthalmic goitre, gouty conditions, and asthma, vaccines should ***not be used.***—Sir Wm. Willcox, *ibid.* 962.

On Vaccine Therapy and immunisation *in vitro.*—Sir Almroth Wright, L. ii./31,225,277,334.

No proof exists of the therapeutic value of vaccines.—D. Embleton, B.M.J. i./31,355.

Antigen Therapy is now entirely empirical, but it would be foolish to suppose that we have seen the limits of the method of active immunisation.—Sir T. Horder, L. i./32,170.

Autogenous Vaccines, i.e. Vaccines prepared from cultures obtained directly from the patient, should be used (*a*) when the infecting agent belongs to an ill-defined group, *e.g. B. Coli* infections; (*b*) when the infection is severe and it is felt to be too great a risk to wait and see whether stock vaccine is effective; (*c*) when treatment with stock vaccine has failed.—A. Fleming, B.M.J. i./21,254.

Autogenous Vaccines, advantages of. Recent advances in vaccine therapy.—H. E. Annett, B.P. Conf., 1919.

Autogenous Vaccine doses advised by separate pathologists ranged from 100,000 to 400,000,000 streptococci. Uniformity desired.—H. Balme, B.M.J. i./31,604. See also A. G. Shera, *ibid.* 685, and reply 726; and H. Warren Crowe, *ibid.* 767.

Fallacy of putting up autogenous vaccines in rubber-capped bottles. Difficulty of measuring 0·1 Cc. in a syringe. Sealed ampoules in graded doses preferable.—G. Bousfield, B.M.J. ii./31,827.

Technique of Injecting a Vaccine.

The skin should be sterilised with Iodine or Diluted Cresylic Disinfectant; too strong applications should be avoided.

The best sites are: (1) the arm, preferably the upper arm near the insertion of the deltoid; (2) $1\frac{1}{2}$ inches below the centre of the clavicle; (3) high up on the buttock near the spine; (4) the flank.

The inoculation may be made either into the subcutaneous tissue as sites (1) and (2) above or into the muscles (site 3). The ampoule should be shaken before use, as the emulsions settle.

Local and General Effects of the Injection.

(*a*) *Local.*

In 12–24 hours there may be some redness, swelling, pain, and tenderness at the site of inoculation, and for an area of 2–3 inches around it.

(*b*) *General Effects*:—

(1) One of the results is the production of a local hyperæmia round and in the infected focus; this is best seen in cases of iritis, laryngitis and acute skin infections. (2) Other effects are a rise in temperature in about 12 hours, which should not exceed 1·5° F., a rise in pulse rate, which should not exceed 20 beats, a slight feeling of malaise and perhaps a little headache; these should all pass off within 24 hours: if the temperature and pulse were previously unduly high they then should assume a better level, and the malaise and headache should be succeeded by a feeling of increased well-being.

Other clinical symptoms should also improve. If none of these result the dose employed was too small.

The signal for reinoculation is retrogression of the patient or failure to continue to improve.

Increase of dosage is indicated by failure to secure any general reaction, or by mere transitory improvement on the part of the patient.

The more acute the lesion and the greater the toxæmia of the patient the smaller should the initial dose be ; in the case of the more chronic lesions a considerably higher (2–10 times) initial dosage may be safely used. When the blood and lymph supply to an affected part is poor, as for instance the skin and cornea, still higher doses are advisable.

Acne.

The **Acne Bacillus**, *Syn.*, **Bottle Bacillus**, may alone be the cause of acne, especially of the non-pustular forms,—in the majority of cases, however, it is associated with the Staphylococcus.

Acne Bacillus Vaccine, *Syn.*, **Acne Bacterin**, is indicated in the above cases where comedones are the principal features. Combination with polyvalent staphylococcus albus vaccine may be advisable. *Initial dose*, 5 millions ; then increasing doses—a final dose of 500 millions may be wanted. The interval between doses is 7 to 10 days.

Ampoules are prepared each containing these doses.

For cultivation of the Bacillus and preparation of Vaccine see Vol. II.

Vaccine treatment seldom of value in acne punctata. Autogenous better than stock vaccines.—H. G. Adamson, L. i./25,401.

Acne Bacillus and Staphylococcus Mixed Vaccine is prepared as follows :—

Acne, 5 millions with Staphylo. 100 and 250 millions ; Acne, 10 millions with Staphylo. 250, 500, 1,000 and 2,000 millions ; Acne, 20 millions with Staphylo. 2,000 millions.

Anthrax. The following serum has been used considerably :—

Anti-Anthrax Serum (Sclavo's). Each tube contains 10 Cc.

An Antibacterial Serum, stimulating the activity of the phagocytes. Prepared by immunisation of asses at Siena in Italy.—(Legge).

Dose.—In three or four different parts of the skin of the abdomen, injections of 40 to 80 Cc. are given at one time. After 24 hours if there has been no improvement either in the general or local condition, further injections of 40 to 80 Cc. are to be made and repeated next day if necessary. *Begin treatment early.*

Rise in temperature following the injection is favourable. Sometimes a rash develops three to eight days after, with or without febrile symptoms : it is unimportant. The Serum *keeps* two years in the dark—a slight deposit in it is negligible. *Technique.*—Disinfect the skin with Ether, and then with a 2 per 1,000 Sublimate solution or with Ether Soap. After injection wash the site of injection again and apply a drop or two of Collodion.

For **intravenous injection** in severe cases 10 Cc. or more repeated after 2 or 3 hours if necessary into, where possible, one of the superficial veins at the back of the hand, distended by pressure on the forearm.—L. ii./05,803.

Results with Sclavo's Serum.—Reduces temperature and increases feeling of comfort. Wool-workers appear to acquire slight forms of Anthrax giving them immunity. A case of recovery by Sclavo's Serum first intravenously, then in the loin and subsequently *per os.* (Undoubted cases of internal anthrax rarely show the bacillus in blood or pericardial or pleural effusion more than 24 to 36 hours before death, hence justified in diagnosing by clinical symptoms.)—B.M.J. i./11,751.

In a successful case treated there was apparently an incubation period of 10 days,—rapid amelioration after injection and recovery without excision of the pustule,—most cases have been excised.—B.M.J. ii./11,103.

Skin vaccination against anthrax, from experiments on 11 guinea-pigs, confers immunity, including all the organs. The animals proved resistant to several times the fatal dose injected into the brain.—Comptes Rend., July 10, '25, per Jl. A.M.A. ii./25,1259.

Anti-anthrax serum alone, *i.e.* without surgical excision of the local lesion, is the treatment of choice. 50 to 100 Cc. are given intravenously, and the injections continued daily until temperature drops to normal. It is best to begin with 50 Cc. normal saline solution containing 5 drops of serum. Also of value prophylactically in 10 Cc. doses subcutaneously.—A. E. Hodgson, L. ii./28,594.

Anthrax treatment. Serum 80 to 300 Cc. as a preliminary repeated until temperature is normal. '606' in dose of 0·9 Gm. daily for three days, and a fourth dose after a week. Large doses advised.—C. G. Brentnall, L. ii./30, 1174.

Fatal case of anthrax. Eusol fomentations and Sclavo's Serum used.—A. L. K. Rankin, L. i./31,407.

Serum Anticarbuncosum. *Syn.* Suero Anticarbuncoso, F.E. VIII., is made by hyperimmunisation preferably of the horse.

Anthrax Protection.

A disinfection station erected near the wool warehouses at Mersey Docks under the auspices of the Home Office treats **wool arriving from the East** by a method by which not only is the natural protection of the anthrax spores removed but the spores themselves are subjected to destructive effect of Formaldehyde. The material is first washed with an alkaline warm soap solution and then disinfected at 102° F. with 2 or 2½% Formaldehyde Solution for 20 minutes in 2 stages of 10 minutes each, then dried and cooled.—B.M.J. ii./21,952. Plate *ibid.* opp. 933.

Seymour Jones' 'Formic Mercury' process. Hides, skins, etc., are treated in the 'soak' process with Formic Acid 1 to 2% and Mercury Perchloride 0·02%.—L. ii./11,1260.

Shaving brushes infected conveyed anthrax—infection probably due to disease in the animals from which the hair used in their manufacture was originally obtained.—R. R. Elsworthy, L. i./16,20. See also E. H. Snell and E. W. G. Masterman, L. i./16,242.

Similar source of infection. The serum promptly used saved patient's life. A swab examined at Torquay from a pustule found to contain Anthrax B. at 11 p.m. 'Phoned to Martindale's for serum which was placed on the train leaving Paddington at midnight. It was administered to patient before 6 a.m. and undoubtedly saved patient's life.—C. Owen, P.J. i./17,62.

Wool and mohair even when washed clean may yet be contaminated with anthrax.—L. i./26,107.

Mortality from malignant pustule (a variety of external anthrax) reduced in Italy to 5·3% since the introduction of treatment by anti-anthrax serum.—B.M.J.E. i./26,42.

Bronchitis and Pulmonary Catarrh.—The bacteriology of bronchitis is broadly speaking the same as that of the common cold. The predominant organisms in their order and occurrence are :—

B. Influenza	present in 40%.	*M. Paratetragenus*	present in 23%
Pneumococcus	,, ,, 52%	*B. Friedlander group*	,, ,, 7%
Streptococcus	,, ,, 53%.	*B. Septus*	,, ,, 2%
M. Catarrhalis	,, ,, 72%.	*Streptothrix*	,, ,, 3%

(Sputum to be examined after washing out the mouth and throat, and expectorating into a sterile bottle immediately on waking.)

The marked relative absence of *B. Septus* is notable. The infections of the lower passages are commonly mixed ones. The *pneumococcus* may be regarded as a frequent cause of bronchial catarrh and the most dangerous to the patient. Note also that *B. Influenzæ* may be resident in the bronchi or pulmonary cells without giving localised though marked constitutional symptoms. The sputum voided may be almost *nil.*

Doses of the Vaccines are given under the various headings.

Autogenous Vaccines are more likely to be efficacious than stock ones and it must be remembered that variation in the flora is liable to occur during the progress of immunisation, hence repeated examination necessary.

Bronchitis is pre-eminently suited for Vaccine therapy—old age and a desperate condition of the patient are not contra indications to treatment.

Chronic bronchitis treated with autogenous vaccines. If possible, the sputum should not be allowed to get cold. Nasal cultures to be sent in addition.—L. Mackey, B.M.J. ii./22,715.

Catarrh, Nasal and Tracheal.

The organisms principally involved—either singly or mixed in setting up acute catarrhal infections of the respiratory tract are the *B. Influenzæ, Pneumococcus, B. Septus, Streptococcus* and *M. Catarrhalis.* The organisms appear in cycles. Thus *B. Septus* may be found in 80 to 90% of the cases in each epidemic for two or three successive years and then disappear altogether for 4 or 5 years.

Combined Vaccine for Colds and Influenza (*Wimpole Institute, T.M. No. 392346). *Syn.* **B. Influenzæ, Pneumococcus, Streptococcus, B. Septus and M. Catarrhalis Vaccine.** The composition of this vaccine is altered slightly from time to time to suit prevailing epidemics; for general use at present it contains *B. Influenzæ, Pneumococcus, Streptococcus, B. Septus* and *M. Catarrhalis* in the proportions 2 : 1 : 1 : 1 : 1.

Ampoules for Hypodermic Use contain 25, 50, 100, 250, 500 and 1000 millions of each organism respectively with exception of *B. Influenzæ* which is double.

Initial dose.—The contents of an ampoule containing 50 millions of each organism. *Children* of 10 to 15 years receive half doses.

A dose of 100 millions *as a preventive* against colds in those subject to such attacks, followed in 7 days by one of 250 millions, and again after 7 days by one of 500 millions, which may well be repeated or increased to 1000 millions if no marked reaction ensue, has proved very efficacious. It is also suitable for immunising against and treatment of influenza.

The earlier the treatment is begun the better (with patient in bed); inoculation is best in the evening between 7 and 10.

Has proved of value not only in the treatment of catarrhs, acute and chronic, but also in pulmonary phthisis, where bronchitic symptoms are conspicuous—in such cases where Staphylococci or Streptococci are the secondarily infecting organisms no good can be expected from its use.

Anti-catarrhal vaccine evidently of value as patients come regularly in the autumn for a dose.—H. H. Mills, B.M.J. ii./30,735.

Common colds may be caused by ***filterable virus.*** Report on Public Health Subjects Min. Health Report, No. 57, 1930. Set about observing over a lengthy period the flora of the respiratory tract of a sample of the community and compares findings with the incidence of respiratory diseases. In the winters 1925–26 and 1926–27 there was an increase of respiratory diseases in Manchester, but whilst in the former there was little or no 'flu,' in the latter there was. There is some evidence that 'flu' is produced by Indol-producing hæmophilic bacilli.—B.M.J. ii./30,569. The organisms may be secondary. —Prof. A. Fleming, B.M.J. ii./30,736.

Common cold infection due to filter-passing virus incapable of growing on known culture media.—John J. Abel Fund, L. ii./30,1192.

Micrococcus Catarrhalis Vaccine.—Of service in nasal tracheal and bronchial catarrhs, both acute and chronic, in bronchitis and bronchitic asthma and in catarrh of the middle ear, when the causal

relationship of this organism to the attack has been demonstrated. *Initial dose* of 10 millions may be repeated in 5–7 days. In chronic cases 1000 millions or more may be ultimately necessary.

Ampoules contain 10, 50, 100, 250, 500, and 1000 millions.

M. Catarrhalis is one of the constituents of the Combined Vaccine for Colds *antea*. *M. Catarrhalis* infections may begin at any part of the respiratory tract—characteristically with an inflamed feeling of the fauces and naso-pharynx.

Chronic tracheal catarrh is frequently due to infection by this organism or *M. paratetragenus*, to which secondary infection by staphylococci, streptococci, pneumococci, and other organisms may be added, or to the pneumococcus alone. Cultivations from the trachea showed that non-Gram-staining *Cocci* are present in 78% of normal throats, and 68% of catarrhal throats.

M. Catarrhalis is well known as a cause of common colds and of influenza, bronchitis, and pneumonia. Causes very irritable cough with scanty viscid expectoration. It grows best on blood agar, and produces no acid in glucose broth. *B. Septus* causes a mild pharyngitis with painful throat, muscular pain, with, however, no temperature and little or no nasal catarrh,—probably a common cause of stiff neck and muscular rheumatism. *B. Friedlander* occurs in many acute and chronic colds, and may cause very profuse coryza.

Chronic Nasal Catarrh treated by Autogenous Vaccines; a good proportion of cures.—L. Mackey, B.M.J. ii./19,159.

Directions for taking secretion for preparations of an Autogenous Vaccine.

If in the throat, the mouth is to be washed out in the morning with sterile water, and the throat to be gargled, as also teeth washed with same, then patient is to spit once into a sterile bottle. If, on the other hand, the infection is in the nose, the entrance to the nostrils should be washed with soap and water and discharge blown into a sterilised bottle, or better, post-nasal swabs should be taken.

See also **Influenza and Pneumonia.**

Cerebro-Spinal Fever, *Syn.* Cerebro - Spinal Meningitis. Malignant Purpuric Fever, Petechial Fever, Spotted Fever.

Characters of Cerebro-Spinal Fever.

It is an acute epidemic disease, characterised by profound disturbance of the central nervous system, indicated at the onset chiefly by shivering, intense headache or vertigo, or both, and persistent vomiting; subsequently by delirium, often violent, alternating with somnolence or a state of apathy or stupor; an acutely painful condition with spasm—sometimes tetanoid—of certain groups of muscles, especially the posterior muscles of the neck, occasioning retraction of the head, and an increased sensitiveness of the surface of the body. Throughout the disease there is marked depression of the vital powers; not unfrequently collapse; and in its course an eruption of vesicles, petechial, or purpuric spots, or mottling of the skin, is apt to occur. If the disease tend to recovery the symptoms gradually subside without any critical phenomena, and convalescence is protracted; if to a fatal termination death is almost invariably preceded by coma. After death the enveloping membranes of the brain and spinal cord are found in a morbid state, of which the most notable signs are engorgement of the blood vessels, usually excessive, and an effusion of sero-purulent matter into the meshes of the pia mater and beneath the arachnoid. The name 'Spotted Fever' given to this disease is a misnomer, as the spots are by no means constantly in evidence.

Useful "Remarks on Cerebro-Spinal Fever in Camps and Barracks" by Sir Wm. Osler, include the following. The disease spreads slowly or indeed not at all from foci of prevalence in various parts of a country. It has prevailed chiefly in the winter and spring months; an epidemic rarely lasts into the summer. It has a higher death rate than any acute infection except plague and cholera but the total mortality is not great as the case incidence in the community is low. It will kill within 24 hours—or less.

As a rule the organisms disappear from the naso-pharynx of healthy "carriers" in the course of a few weeks. The organism (meningococcus) is a

germ of low virulence, widely spread in the community and of intense virulence in an individual once it has passed the portals of protection. Whether the organism gains access by direct invasion of the meninges from the naso-pharynx through the ethmoidal or sphenoidal routes or by the blood stream is a matter of discussion. The disease may be endeavouring to win a place among the great epidemics of the world. Soldiers are peculiarly liable (owing to exposure of bad weather and crowding in barracks, etc.), but in the great campaigns of the 19th century cerebro-spinal fever played no part as a camp disease. The incubation period may be as long as 30 days. The organism has never been isolated from dust, etc. Overcrowding must be prevented. Ventilation essential, all windows to be open day and night.

Blood-sucking insects are now known not to convey the disease.

In some cases septicæmia occurs. The meningococcus does not necessarily produce naso-pharyngeal catarrh but catarrhal conditions predispose to meningococcic infection.—C. Worster-Drought and A. Mills Kennedy.—L. ii./17,711.

Royal Society of Medicine (Section of Epidemiology and State Medicine) Debate :—

Various strains of the organism exist—to one of which the name para-meningococcus has been given. The *healthy* carriers seem to play the most important part in the spread of the disease. Discrimination between the meningococcus and the gonococcus a matter of some importance—gonococcic meningitis does occur, but rarely.

East African epidemics. The disease has assumed very virulent characters. In 1913 in one tribe it killed anything between 20,000 and 40,000. Description and division of the infection into five general types.—E. N. Butler, L. i./15,692.

Clinical features in children.—F. E. Batten, L. i./15,964.

Gordon and Murray carried out a systematic examination of a number of cerebro-spinal fluid meningococci and divided same into Four Groups Types I. to IV. Types I. and II. are the main groups. P. Fildes confirms their results.—L. i./18,92.

Inhibitory action of saliva (normal) on the meningococcus. The action is due to its content of living bacteria (streptococci). Hence avoid contamination with saliva in taking swabbings from naso-pharynx.—M. H. Gordon, B.M.J. i./16,849.

Age incidence. In the epidemic of 1914–1915 and 1915–1916 the most susceptible age was under 5 years—*i.e.*, during infancy and early childhood. There was a marked falling off of cases after adolescence was passed. The least susceptible age apparently was 35–40. It is a weather disease associated with the sudden saturation of the atmosphere with water vapour. The naso-pharyngeal mucous membrane is then more easily traversed by the meningococcus.—A. Crompton, L. ii./17,14.

Lumleian Lectures. Epidemiology. Mode of spread of infection. Path of meningeal invasion. Clinical forms—a very exhaustive paper.—Sir H. Rolleston, B.M.J. i./19,406,536.

Meningo. Carriers, Study of.—D. Embleton and co-workers.—L. ii./19,679.

Bacteriology and Diagnosis.—A diplococcus, evidently *Diplococcus intracellularis meningitidis* (Weichselbaum), has been isolated from the cerebro-spinal fluid, and from the brain membrane and the purulent exudate. The old view concerning transmission was that the organism, by whatever way transferred, gained lodgment in the naso-pharynx and thence migrated to the base of the skull and the mengines. The present view is that infection takes place by direct contagion and that it is primarily a blood infection, localising later in the central nervous system—indeed, it frequently remains confined entirely to the blood stream, not invading the central nervous system at all. For this reason it is now usual to make blood cultures, as well as spinal fluid ones.—Stitt.

The organism resembles the gonococcus *M. Catarrhalis, M. flavus*, etc., in morphology, in being intracellular, and in its non-staining by Gram's method. It requires special media for its cultivation and is recognised by its growth, sugar and agglutination reactions. It will not grow at a temperature below 25° C. and without precautions against drying it will die out even at 37° C.

The organism is grown on **Nasgar Medium** (*v. M. Gonorrhœa, Vol. II.*, or preferably on Gordon and Hine's **Trypagar.**

Gordon's Memorandum on cerebro-spinal meningitis to the L.G.B. Characters of the *Meningococcus* detailed. *M. Catarrhalis* likely to be confused with it.—L. i./07,598.

"Chocolate" Medium made by heating 3 pts. of defibrinated bullock's blood with Trypsin Agar and 1% Glucose until it becomes a glossy opaque solid medium of chocolate colour. Results of cultivation of the meningococcus more successful than those with Serum—trypagar medium and others. —H. W. Crowe, L. ii./17,201.

West's Swab for taking swabbings from the posterior wall of the pharynx consists of a wire in a bent glass tube and resembles Bellock's sound in glass instead of metal. These obviate the use of a tongue depresser. Inoculations are made *direct* onto Nasgar Medium and grown for 24 hours. Likely colonies can be cultivated on plates and incubated at 37° C. and at 23° C. Colonies growing at 37° C. and not at 23° C. and having the requisite appearance are taken as meningococci. (N.B.—Whatever medium is used cultures must always be prepared immediately.)

The combination of either rash or vomiting, squint or rigidity of limbs, and opisthotonos, with a clinical picture otherwise resembling Influenza is very strongly suggestive of the graver disease.—E. Hobhouse, B.M.J. i./15,419.

Diagnosis depends to a very great extent on realising there are three distinct stages of the infection, viz.—(1) Catarrhal, (2) Septicæmic, (3) Meningeal.—A. Lundie, D. J. Thomas, and S. Fleming.—B.M.J. i./15,466.

Lymphocytic meningitis. Cases in which with acute symptoms are just like those of cerebro-spinal fever, the cerebro-spinal fluid though under high pressure contains no polymorphs and no meningococci but lymphocytes in excess. Never fatal.—W. P. Herringham, B.M.J. i./17,832.

Effect of culture media on agglutination of meningococci. Individual strains of meningococci when grown on nut Nasgar media become more agglutinable than when they are grown on legumen agar, with or without the addition of blood.—I. Walker Hall and G. E. Tilsley, L. ii./21,494.

Sugar (reducing Fehling's Solution) is absent in the acute stage, but may return in some degree as the infection recedes.

Treatment and Disinfection of Carriers.

Carriers are much more common in winter than in summer—the disease is peculiarly one of cold, inclement weather. Young children are most susceptible and contact with a carrier is more dangerous for them than for an adult. Most cases cease to be carriers within a few weeks and it is a question whether treatment of carriers is of much avail, as some persist in the carrier state in spite of any treatment or environment.—Stitt, 1927.

Prophylactic in cerebro-spinal meningitis and influenza for treatment Tincture of Iodine mixed with an equal quantity of honey—two or three drops of the mixture on the tongue several times a day effectual.—J. A. Taylor, B.M.J. i./21,776.

Inhalation (? spray) composed of Iodine 12 Gm., Guaiacol 2 Gm., Thymol 0·5 Gm., Alcohol 200 Cc. with Potassium Iodide 6 Gm. used five or six times a day. Swab the throat out with a 3 to 5% solution of Iodine in Glycerin. Used in the French Army.—Sir Wm. Osler, B.M.J. i./15,189.

Antipyrin, Phenacetin and Opium are useful. Hydrotherapy in the form of the tub bath at 98° is recommended. All cases bear stimulants well. No drug seems to have any specific effect. Calomel and a counter-irritant in the form of Liquor Iodi or Liquor Epispasticus over the cervical spine gives some relief to the headache. Cardiac tonics advisable, Phenacetin and Caffeine if temperature unduly high. Chlorodyne gives great relief.

Soamin 5 grains intramuscularly on alternate days thought to be secreted in the cerebro-spinal fluid and to have deterrent effect, but it is not without danger.

Repeated lumbar puncture even in severe cases, with removal of from ½ to 1 ounce cerebro-spinal fluid together with injections of Saline. Excellent results—better than serum.—M. Foster.

Spraying with **Permanganate** (1 in 1000) is of some service.

Disinfect all articles likely to be contaminated with discharge with 5% Cresol.

Tartar Emetic, ½ grain doses intravenously. Temperature normal in 60 hours.—S. Neave, L. i./16,1101.

Zinc Sulphate 1·2% as a steam spray or 1% Chloramine solution directly applied for treatment of ' carriers.'—M. H. Gordon and M. Flack.

Cerebro-spinal fever in R.A.F. in January and February, 1931, at Uxbridge among recruits. Treatment—Antimeningo Serum sheet-anchor in *previous* attack, but the type of Meningococcus in this outbreak differed, being Type I. instead of Type II. as previously. Saline irrigation by subarachnoid lavage. Naso-pharyngeal douche and gargle of Permanganate 1 in 5,000, or Sodium Bicarbonate and Borax of each 2 drachms, with Liq. Phenol 1 drachm, and Sugar ½ ounce, to 1 pint Water, efficient, with Zinc Sulphate 1% in conjunction by means of Levick's Steam Spray.—H. E. Whittingham, T. M. Kilpatrick and E. W. B. Griffiths, B.M.J. i./31,1101.

Antimeningococcus Serum of the Lister Institute.

(*Special provisions apply in the manufacture of this Serum under the Therap. Subs. Act (and Regns.* 1925, 1927.)

Dose.—30 Cc. (except when less than this amount of cerebro-spinal fluid can be removed), *intraspinally* by lumbar puncture (gravity method) at the earliest possible moment and repeated daily for at least 4 days. In children under 5 it is inadvisable to give more than 10 Cc. In severe fulminating cases the dose if possible should be 45 Cc. Patient should lie, after the injection, with head and shoulders low and pelvis raised. It is also used intravenously, *e.g.* a *small* dose *intraspinally* and *massive* dose *intravenously*.—(Herrick 1918).

Sixteen cases by lumbar puncture. Vaccines 250 million subcutaneously at the time of first dose of serum. 2nd dose 500 million increased to 2000 million.—C. Worster-Drought, B.M.J. ii./16,689.

For the purpose of standardising antimeningococcic serum, endotoxin of the meningococcus extracted by a modified Besredka's method.—M. H. Gordon, B.M.J. i./18,110. *See* also *ibid.* ii./18,335.

Cerebro-spinal meningitis in Bombay. Treatment with intrathecal injections of Anti-meningococcic serum of the Lister Institute reduced period of illness, prevented the chronic lesions and types of infection, resulted in complete restoration of health in all but a small number of the recovered and greatly diminished fatalities.—P. T. Patel, L. ii./26,541.

Streptococcal meningitis successfully treated by intrathecal injection of anti-meningococcal serum.—C. W. Vining & H. P. Thompson, B.M.J. ii./24,667.

Influenzal meningitis. A case recovered under Anti-meningo Serum intravenously and intraspinally. Influenza bacillus found in cerebro-spinal fluid. Only three cases of recovery on record.—J. Gibbens, L. i./31,291.

In spite of overcrowding epidemic meningitis is much less frequent in the Navy than in training depots ashore, due to seamen becoming immunised by contact with carriers of *N. meningitidis* in the training depots.—S. F. Dudley, L. i./31,511.

Specific univalent serum in preference to multivalent.—H. Stanley Banks, L. i./31,747.

Overcrowding as factor in cerebro-spinal fever outbreaks. The Navy is comparatively free.—A. Compton, L. i./31,835.

FR. CX. SUPP. 1920 states, the receptivity of animals being extremely variable, it is impossible to determine by tests, its therapeutic activity.

CONFERENCE ON STANDARDISATON. Great Britain, America, France and Germany all adopt different methods at present. Further work to be carried out.—L. ii./22,1294.

P.G. VI. requires Meningococcic Serum to have a titre 1 : 100 in complement deviation test and in bacteriotropic tests, a titre of at least 1 : 1000.

Double, quadruple and eightfold strength is also prescribed.

For Cerebro-Spinal Fluid, Examination of, vide Vol. II.

Cholera.

The disease is marked by the presence of the *Spirillum choleræ.*

Anti-Cholera Vaccine. *Syn.* **Cholera Vibrio Vaccine.**—As an immunising agent only. A *dose* of 500 millions may be followed by constitutional disturbance, local redness, pain and swelling of the corresponding lymph glands, effects which should pass off within three days. A dose of 1000 millions should be given five or six days later and will probably produce less reaction. This dose should be repeated or doubled after a further 7-10 days. Full immunity is reached about a week later and persists for six months to a year.

Inoculation was compulsory in the Austrian Army after cholera broke out in the Serbian campaign. 1 Cc. of an emulsion of dead cholera bacilli was given subcutaneously and repeated 4 to 6 days later.—B.M.J. i./16,65.

Cholera inoculation was discussed at the German Medical Congress, Warsaw, 1916 (B.M.J. i./16,27). There was difference of opinion as to the probable duration of resultant immunity. For military purposes *double* inoculation (Cholera and Typhoid) was practised in urgent times—the cholera to be repeated in 6 months, the typhoid in 8.—B.M.J. i./16,192.

Prevention and treatment by saline transfusion. See Normal Saline.

The prophylactic Vaccines of **Haffkine** have been used with success in India by employing a growth of the spirillum, the virulence of which has been increased by growth in the peritoneal cavity of guinea-pigs. They are :—

(1). Weak. (2). Strong. The dose of these preparations is 1 Cc. The second is injected 3 to 5 days after the first (the weak) one. They have to be freshly prepared.

A comprehensive report on recent advances in knowledge of cholera.—Lt.-Col. J. H. T. Walsh, T.D.B. 18/21,69.

Fish or shellfish origin of cholera in London in 1854. Need of regulating sale of small fish from shallow areas.—W. H. Hamer, L. ii./22,763.

A para-cholera vibrio isolated from several cases.—T. Kabeshima, T.D.B., Vol. 19, 1922/738.

'Appalling' death rate of cholera in Mesopotamia—40%. Probably a large percentage was bacillary dysentery. Dilute rice water instead of milk diet and Magnesium Sulphate, enough to get several motions, and on no account Opium. This procedure was effectual.—Lieut.-Col. Henry Smith, B.M.J. ii./22,1049.

House infection in cholera. Statistical Investigation found of value in India.—Lieut.-Col. A. G. McKendrick, B.M.J. ii./22,1266.

India may still be regarded as the home of cholera and Bengal as the endemic home, the evidence being that cholera in the rest of India is dependent on cholera in Bengal.—A. B. Fry, I.M.G., July '25,307.

The continued existence of cholera a disgrace to India. Every other civilised country of the world has freed itself of the cholera menace and if a determined effort were made in India the same result would be obtained.—I.M.G., Feb. '25,75.

Cholera epidemic in Russia. Encouraging figures under American Relief Administration.—L. ii./22,306,421.

Pilgrims and cholera. The religious Fairs and Festivals have a sinister influence.—L. ii./22,673.

During the first 6 months of 1922, 29,264 cases occurred in the three Soviet Republics of European Russia, 4,963 in Caucasia and 1,864 in Asiatic Russia.—B.M.J. i./23,971.

Precautions against cholera in Roumania. Isolation of persons from infected parts of Russia.—L. i./23,46.

Alkaline Starch Medium for isolating Cholera Vibrio from faeces in the case of Carriers.

The cholera organism alone of all the intestinal organisms acidifies starch (M. H. Gordon). Emulsify Powdered Agar 30 Gm. with cold water 250 Cc. Emulsify separately Peptone 10 Gm. and Sodium Bicarbonate 1·5 Gm. in a further 250 Cc. of water. Mix and add water 500 Cc. Dissolve in the steamer, clear with egg and filter. Emulsify Potato Starch 10 Gm. in some of the (cooled) medium and add to the rest. Sterilise by the fractional method. Add Litmus solution to make it blue. Cholera colonies acquire a faint pink more quickly (24 to 26 hours) than the allied vibrios.—H. Graeme Gibson, B.M.J. ii./16,454. For isolation from water see *Vol. II.*

It is stated that 11·8% Alcohol will kill the *Cholera vibrio* in 4 hours or less and that 7·8% will cause its disappearance in one day.—B. B. Brahmachari, per Jl. Trop. Med., Sept. 1/27,225.

Cholera and entero colitis antivirus orally gave favourable results.—Prof. Besredka, L. i./29,1092.

For further references *vide* Previous Editions.

Cold Vaccine. *See* **Catarrh.**

Anti-Colon Bacillus Serum. *Dose.*—10 Cc. or more. Is prepared from horses which have been immunised against a number of types of *B. coli* principally from cases of peritonitis and puerperal fever. Supplied in 25 and 50 Cc. vials.

The action of this serum is chiefly bactericidal, though also possessed of antitoxic properties.

In acute *B. Coli* infection of the kidney, Dudgeon has advised 25 Cc. of the Serum daily for three days, combined with Calcium Lactate to avoid rashes, joint pains, etc., better in his opinion than vaccines.

Investigations on *B. Coli* showed conclusively that these micro-organisms vary in each host; and that probably there are many species which exhibit the same microscopical and cultural appearances.

Colon Bacillus Vaccine is used in the treatment of post-surgical suppuration in abdominal cases, such as sinuses which refuse to heal after operations upon the appendix, gall bladder, kidney, or intestines; also in bacilluria complicating tubercular cystitis, in the nephritis of pregnancy and in endometritis, when due to infection by *B. Coli.* Initial doses of 5 million organisms may be repeated at intervals of 7–10 days, and may be gradually increased till 100 millions or more are being given. If the doses employed cause any disturbance of the general conditions as evidenced by rigors or rise of temperature this must be taken as indication either of pus under pressure or if not this, for diminished subsequent dosage.

Discharging sinuses should, if possible, be kept open, as closing is likely to result in rigors and severe constitutional disturbance.

Immunisation of the patient 3 to 4 days prior to abdominal operations in cases where the presence of pus is suspected is to be advocated—for this purpose a dose of 500 millions may be employed.

In cases of bacilluria the urine should be kept well alkalinised by full doses of Sodium Citrate or Sodium Bicarbonate.

Ampoules contain respectively 10, 25, 50, 100, 250, 500 and 1000 million organisms.

Vaccine treatment of *B. Coli* infections of the urinary tract is commonly practised with generally favourable results.

Appendicitis 22 cases with anti-colon B. Serum 20 Cc. dose and vaccine 100 million a few days later.—A. Cowan Guthrie, B.M.J. i./15,67.

Arthritis treated by B. Coli Vaccine intravenously—" non-specific therapy."—Miller and Lusk, Jl. Am. Med. Assn., Jan. '16,1756; see also B.M.J. i./18,196.

Rheumatoid arthritis treated by Bacillus Coli Vaccine *intravenously* 50 to 200 millions for first dose, with patient in hospital. Rise in temperature a few hours after injection (100 or 103° F.). Subsequently up to 500 million or more given. The method thought, at least, to be an adjuvant to more recognised methods.—R. J. Perkins and C. B. White, B.M.J. i./23,411.

Hay fever treated by Autogenous *B. Coli* Vaccine, *see* **Hay Fever.**

See also ***Protein Therapy.***

Diphtheria Antitoxin, **Serum Antidiphthericum,** P.G. VI., U.S., P. Ital. V., F.E. VIII., P. Belg. IV., etc.

(*Special provisions regarding the manufacture of this Antitoxin are made under the Therap. Subs. Act* 1925 *and Regns.* 1927.

The Antitoxin combats the disease in the human subject.

It retains its activity for 10 months if kept in a cool and dark place.

Dose.—Should be stocked in phials containing 8000 *units for treatment, and* 500 *units for prophylaxis; the former should contain the* 8000 *units in less than* 10 *Cc. A curative dose can then be given (intramuscularly) in one injection. For prophylaxis,* 500 *units should not be contained in less than* 2 *Cc. Not less than* 8000 *units to be given for any age; larger initial doses, e.g., from* 16,000 *to* 30,000 *units, are required when the case has been delayed until the* 3*rd or* 4*th day from onset.—Min. Health Memo.,* 1922. *The immunity is claimed to last* 3 *weeks. Warm the Antitoxin by standing in water at* 40° *C. for* 10 *minutes. Do not wait bacteriological diagnosis. Cleanse the skin with Ether Soap, and inject in the flank or between the scapulæ. In a sense too much cannot be given. Intravenously* 30,000 *to* 50,000 *units for a desperate case (neutralises toxin more rapidly). Up to* 300,000 *units have been given intravenously.*—B.M.J. ii./31,614.

In toxic cases give a preliminary injection of Antitoxin ***intramuscularly***; 1 hour later make a resting blood-sugar estimation, and inject ***together intravenously*** (very slowly at 37° C.) 32,000 to 100,000 units antitoxin and 20 Gm. Dextrose in 50 solution; make further blood-sugar estimations at 1, 1½, and 2 hours after, and if the last figure shows a return to normal give 10 to 30 units Insulin intramuscularly, and subsequently Glucose by mouth or intravenously. Case mortality reduced from 35·9% to 22·5% and noticeable reduction of serum-sickness.—E. C. Benn and co-workers, L. i./32,282.

Sometimes given *per anum* and *per os*, but opinion is, in general, against these.

The **number of immunising units** contained per Cc. varies in the different pharmacopœias and with different manufacturers.

Antitoxin units discussed at Conference on Standardisation (Paris). The **Erhlich Standard Unit** should be considered as the international standard. —L. ii./22,1294.

Standardisation of Sera and biological products. System of checking national units of antidiphtheria serum by the international unit (supplied from the Copenhagen Institute) working well. American, British and German units tested and found identical. Proposed unit for Tetanus antitoxin half the existing American unit. Further investigations proceeding with dysentery, pneumococcus, anthrax, Malta fever and other sera.—Health Committee, League of Nations, L. i./24,720.

U.S. X. has **Antitoxinum Diphthericum.** *Syn.* Serum Diphthericum Purificatum, Concentrated Diphtheria Antitoxin (U.S. IX.), with potency of not less than 350 Antitoxic units per Cc., and *Average Dose,* Curative 10,000 units: Protective 1000 units. A solution of the Antitoxin-bearing globulins, containing Sodium Chloride and preserved with not more than 0·5% Phenol or 0·4% Cresol. Removal of serum albumen may reduce the untoward serum rashes which frequently occur with ordinary Antitoxin.

The purification is based on precipitating the euglobulin and albumin, and the pseudo-globulin rich in antitoxin remains. Another method consists in adding the specific antigen to an antiserum and obtaining an antigen-antibody complex, which is then split into its two components.—L. i./29,292.

P. JAP. IV.: Liquid Serum is 500 Ehrlich units in 1 Cc.

In addition to the liquid sera, **Dried Serum** (U.S. IX., F.E., P.G. VI., P. Jap. IV.) in amber coloured scales is manufactured by evaporation at a temperature not exceeding 40° C., or by means of Sulphuric Acid *in vacuo*. This is more suitable for export. The scales are dissolved in sterilised water. It is not soluble in hot water (above 50° C.), nor in alcohol. The directions given by each maker should be followed.

As higher potencies are now used than formerly, rashes, pain and swelling which sometimes result, are less frequent. Calcium lactate is said to relieve the rash, pain, etc.

For extracts from the (earlier) literature on this Antitoxin and notes on the **Schick Test, Serum Rashes, Untoward Results and Diphtheria Carriers, Diphtheria Endotoxin** and **Toxin-Antitoxin** see *Vol. II.*

Large initial doses of antitoxin given as early as possible are successful in diphtheria.—R. Davison, B.M.J. ii./21,918.

The child requires as large a dose of Antitoxin as the adult. Intramuscular injection best, deeply into the vastus externus, not the gluteal region. Not less than 6,000 units. Importance of the recumbent position in bed in treatment—not even a pillow should be allowed for a minimum of 3 weeks.—F. H. Thomson, L. ii./21, 69.

Value of Diphtheria Antitoxin limited to first three or four days of the disease. Early diagnosis and treatment essential. All suspicious cases should be injected at first sight.—D. MacIntyre, L. i./26,855.

Intravenous injection of Diphtheria Antitoxin. Give it slowly. It should be the method of choice.—Poul Iversen, L. i./23,694.

DIPHTHERIA PROPHYLACTIC (TOXIN-ANTITOXIN MIXTURE—*see also Vol. II.*). 1 Cc. doses have been used in America and elsewhere with excellent results.

Manganese Chloride is able to raise the Antitoxin titre of horses immunized to Diphtheria Toxin, but has no effect on those immunized with Tetanus Toxin.—B.M.J.E. i./25,10. Manganese—effect on agglutinins.—B.M.J. i./25,1129.

The tooth brush as a carrier of virulent diphtheria bacilli. Immersion for 1 minute in a 5% solution or for 5 minutes in a 2% freshly prepared solution of standard Lysol found insufficient to kill B. diphtheriæ on artificially infected tooth brushes.—G. H. Culverwell and J. Graham Forbes, L. ii./23,255.

Ichthyol Ointment 10% applied to nasal mucosa of carriers. A negative culture is usually obtained after 5 consecutive days' use.—per Pres., June, '25,247.

Intraperitoneal injection of diphtheria antitoxin—particularly advocated in advanced cases in which the intravenous method cannot be employed.—L. ii./23,994. It gives better results than intravenous or intramuscular.—Am. Jl. Dis. Child., Feb. '25,214, per Pres., Jan. '26,15. In toxic myocarditis.—B.M.J.E. i./25,80.

PUERPERAL SEPSIS well treated with antidiphtheria serum ***orally*** in doses of 30–100 Cc. daily, 10 Cc. being given at a dose, and the strength being 200 units per Cc. Successfully used for over a quarter of a century.—D. M. Paton (Melbourne), B.M.J. ii./24,1139.

The Medellin (S. America) disaster. 48 children, between 2 and 7, given injections of toxin instead of Ramon's Anatoxin, and 16 died. 8,000 to 12,000 units of antitoxin were injected within a few hours, but there was no conclusive evidence that the serum saved any of the children.—B.M.J. ii./31,27.

Cutaneous infection with diphtheroid bacilli—identical with Klebs-Loeffler bacillus, except in toxin production.—J. F. D. Shrewsbury, B.M.J. i./31,539.

Dysentery.

The Lister Institute supplies **Anti-Dysentery Serum** consisting of the serum of horses which have been immunised against the dysentery bacillus (Shiga, Flexner, etc., types) in 20 Cc. vials.

(*Special provisions regarding manufacture are in the Therap. Subs. Regns.* 1927.)

Dose.—Preventive 20 Cc. subcutaneously : curative an initial dose of 40–60 Cc. intramuscularly on the outer side of the thigh (into the body of the *vastus externus*), repeated daily till improvement sets in. For a grave case, 60–100 Cc., repeated daily if necessary. Some dilute 60–80 Cc. with 150–300 Cc. Normal Saline and give *intravenously* (Graham's experience in the war). In any case, give it early. Stools are stated to return to normal rapidly in successful cases, but treatment to be continued. Pains and temporary rashes may result, which need, however, not alarm.

It is stated that while much of the endemic dysentery prevailing in tropical and sub-tropical countries is caused by pathogenic amœbæ, epidemic dysentery due to *B. dysenteriæ* occurs all over the world, and this bacillus is also found in asylum or institutional dysentery, in some sporadic cases of ulcerative colitis and in certain forms of summer diarrhœa.

Keeping Properties. The serum appears to retain its 'toxin'-neutralising power for at least 1½ years, the dry powdered Shiga B. being used as test toxin.—A. T. McConkey, B.M.J. i./17,11.

SERUM ANTIDYSENTERIQUE FR. CX. SUPP. 1920, is obtained from horses immunised with B. dysenteriæ (Shiga). Tested for its antitoxic power.

The League of Nations Commission on the Standardisation of Serum, Serological Reactions and Biolegial Products proposes to adopt a standard serum prepared and distributed by the Danish State Serum Institute to establish the international antitoxic unit. The serum is prepared for distribution in such a way that 1 unit is contained in 1/200 Cc., and a dilution of 1 : 200 contains 1 unit in 1 Cc. A test dose of a dysentery toxin is defined as a quantity, that when 1 Cc. of the serum dilution is mixed with it, the mixture shall cause death in one-third of the mice receiving it by intravenous injection. When a toxin is thus standardised it may be used in titrating serums.—B.M.J. ii./28,111.

Fulminating cases received large doses assisted by Magnesium Sulphate 1 drachm three times daily for the first few days. In bad cases Morphine needed and for very severe tenesmus a suppository containing Cocaine ½ grain and Iodoform 3 grains is useful. Rectal lavage with 1 in 1000 Copper Sulphate and Mist. Simarubæ often benefits chronic cases. Generally there is distinct rise in temperature within 12 hours of injection which may last 48 or 72 hours. Good prognostic sign.—J. B. Fisher, B.M.J. i./17,43. *See also* G. A. Finlayson, B.M.J. i./17,46.

Bacillary dysentery in the Royal Naval Division.—Surg.-Gen. H. D. Rolleston, B.M.J. i./17,258. *See also ibid.* ii./17,539.

In the ***Salonica Forces,*** dysentery was hardly less in importance than malaria. No figures are available to show the relative frequency of the amœbic and bacillary forms. The *latter* was the dominant form, and though amœbic cases were present throughout, it was only late in the season of 1917 that the extent to which this form (the amœbic) prevailed came to be recognised. Evidence of a widespread amœbic infection in its most insidious form, carried about by apparently healthy people, finally accumulated.

The opinion expressed early in the same year by Lieut.-Col. Graham (L. i./18,51) that less than 3% was of amœbic type had therefore to be reconsidered in light of later knowledge.—Col. A. G. Phear, Proc. Roy. Soc. Med., Vol. XIII., 1920, pp. 57–100.

Serum Treatment of Bacillary Dysentery.—B. G. Klein, L. ii./19,775 W. E. Waller, *ibid.* 778.

Bacillary Dysentery.—Med. Res. Com. Report on—reviewed, B.M.J. ii./19, 283.

Bacillary dysentery in Northumberland and Durham. In mild cases in children serum not needed. Severer cases in adults responded well.—J. A. Charles and S. H. Warren, L. ii./29,626.

Vaccine B. Dysenteriæ. *Syn.* **Anti-dysentery Vaccine** (*Therap. Subs. Act proper name*).

Dose for prophylaxis 250, 500, 1000 mill. at intervals of 7 to 10 days. Initial dose for treatment 5–10 millions.

For immunisation and treatment, practically atoxic; supplied in ampoules 50, 100, 250, 500 and 1000 millions.

Directions for preparation of Dysentery Vaccine including experiments demonstrating that the toxicity of an emulsion of B. Dysenteriæ can be reduced or entirely destroyed by dilute hypochlorous acid (1 in 1000 dilution of Eusol) or Hydrogen Peroxide and that the injection of an emulsion of this kind in which the toxin has been destroyed produces a satisfactory degree of immunity.—H. R. Dean and R. S. Adamson, B.M.J. i./16,611.

Dysentery Vaccine (Carbolised) reduced mortality in East Africa. Work of late P. H. Ross.—L. ii./29,1284.

Vaccine therapy *per os* reduced morbidity and mortality from dysentery. Both prophylactically and therapeutically as effective as serum. Of 3,600 men treated in the Rhine Army none contracted dysentery, while 471 cases occurred in untreated men.—Prof. Besredka, L. i./29,1092. Criticism by W. F. Harvey, Prof. A. Fleming and others. 'Difficult to know what antivirus is.'—*ibid*, 1093, 1157.

For details concerning differential diagnosis of Bacillary and Amœbic Dysentery and other Bacteriological data see Vol. II.

Endemic Goitre in certain parts of India, is held by McCarrison to be due to intestinal intoxication. He has followed this up by treating patients with Vaccines prepared from mixed cultures of all the coliform organisms grown from the fæces. Initial dose of 150 millions increased at intervals of one or two weeks to 350 or 500 millions. From four to seven injections being required in most cases. Perfect hygiene of the bowel essential. Goitre incidence of 23% reduced to 2% simply by installation of good water supply. It contained *no* Iodine. Where goitre arises despite these measures, Iodine intake assumed insufficient.—R. McCarrison, B.M.J. i./24,989. See also our pp. 709, 768 and Goitre **Therap. Index**.

Gonorrhœa.

(*See also* Venereal Diseases Act, 1917, and Therapeutic Index.)

Gonococcus Vaccine. Ampoules contain 10, 25, 50, 100, 250, 500 and 1000 million Cocci respectively.

In preparing the Vaccine, cultures are taken from cases suffering from a severe first attack, which has been untreated by antiseptics.

Dose.—In acute urethritis and such complications as prostatitis, vesiculitis, epididymitis, the initial dose is 5 millions, and by judicious use of the vaccine the duration and severity of the disease may be materially shortened. In conjunctivitis and iritis (initial doses 250 millions) and arthritis (initial dose 100 millions) it is stated to be specific. The diagnostic dose in cases of arthritis of doubtful origin is 500 millions (*vide* Streptococcus Rheumaticus vaccine).

A series of injections will certainly free any case of chronic gleet from the gonococcal infection, although it may not succeed in stopping discharge entirely in all cases owing to secondary infections.

Initial doses may be repeated at intervals of 7 days, and gradually increased until a maximum dose of 500 million organisms has been attained. Some cases receive benefit from the injection into the urethra night and morning of an ounce of a liquid culture of Lactic Acid Bacilli.

The injection of gonococcal vaccine usually gives rise to a reaction, which may be local or general. The *local reaction* consists in redness and swelling at the site of injection. The *general reaction* is manifested by a rise of temperature accompanied by increased pain and tenderness in the affected joints (in the case of gonorrhœal arthritis). Both reactions usually subside within twenty-four hours. The reactions are said to be less marked after small than large doses, and to be absent in cases free from gonorrhœa.

In the acute stages of gonorrhœa and cases of uncomplicated chronic urethritis, provided the disease is localised to the urethra, vaccine treatment

is unavailing. Gleet resists ordinary treatment because the prostate is the seat of mischief ; if this gland is massaged every other day for a minute or so by inserting a finger per rectum all the secretion is squeezed out, consequently if an injection of Silver Nitrate 1 per cent or Copper Sulphate 5 per cent be now given, the prostate absorbs the solution, and a gleet which has persisted for months or years may not infrequently be cured in a fortnight.

Gonorrhœal prostatis and vesiculitis. Vaccines of value in some classes.—A. Cambell, B.M.J. ii./23,456.

Metastatic gonorrhœa. Opening remarks in Discussion before the Soc. for Study of Venereal Diseases. Question as to use of Broughton Alcock's method of using live gonococci intravenously.—Sir T. Horder, L. i./23,1304.

Autogenous Vaccine of great value.—Sir W. Willcox, L. i./23,1314. Autogenous vaccines of higher value than stock vaccines. It does not matter how small a dose is given at first, it can easily be increased rapidly until there are signs that the vaccine is taking effect. In gonorrhœal rheumatism care should be taken not to increase the dose by too large an amount daily—the regular emptying of the prostatic focus, and massage every 5 days, the best form of treatment.—Maj. A. T. Frost, L. i./23,1314.

Simultaneous injections of autogenous vaccine (6000 million bacterias per Cc.) with protein of value in gonorrhœa. Initial dose of vaccine 0·2 Cc., increased by 0·1 Cc. to 1 Cc.—A. Tansard, Presse Med., Sept. 19, '25, per Jl. A.M.A. ii./25,1433.

Non-specific Protein (Milk) Injections in gonorrhœa—see p. 670.

Hay Fever.—

Hay fever is caused by a soluble toxin which is innocuous to normal individuals. In hay fever patients the occurrence of some of the reactions associated with the production of immunity,—precipitation of pollen extracts by the patient's serum and complement deviation during the season has been shown. Pollen toxin is capable of giving rise to the production of antibodies. Spontaneous cures occur, *i.e.*, by active immunity production, but more usually patients develop a condition of hypersensibility, each successive season.

A Hay Fever Reaction Outfit is supplied for determining (*a*) whether a patient is susceptible to pollen toxin, (*b*) the degree of such susceptibility, (*c*) the dosage of pollen vaccine suited to any case.

Hay Fever Vaccine. Ampoules contain 50, 100, 500 and 1000 ' units.' Immunisation should be commenced in susceptible persons during February with an initial dose of 25 units :—subsequent doses as above with 7 to 10 days' interval. In treatment the initial dose may be determined by the ophthalmic reaction or failing this give 50 units initially.

' Rush ' inoculation in hay fever. Injections given every 1½ to 2 hours throughout a 14-hour day. Initial dose ranges from 20 to 30 units to 100 or 200 Pollen units according to severity of diagnostic reaction.—J. Freeman, L. i./30,745.

For a consideration of Cutaneous Tests, Reactions from, and Non-specific Protein Therapy in asthma, hay fever and numerous allied affections, see p. 660 et seq.

Influenza Bacillus Vaccine.

The organism only occasionally occurs alone ; frequently it is accompanied by the *Pneumococcus, Streptococcus, M. Catarrhalis,* or the Bacillus of the whooping cough. Many cases of so-called ' Influenza ' are due to the *Pneumococcus, Streptococcus* and *M. Catarrhalis* either separately or together and in these the **Combined Vaccine for Colds**, p. 903, is used. In influenzal septicæmia or

endocarditis, the initial *dose* is 10–25 millions, in true acute influenza 100–250 millions. Chronic influenza, especially if complicated by sinusitis or antral trouble, may persist for years if untreated, and large doses of vaccine, 1000 millions or more, may be needed for its cure. **Ampoules** containing 10, 25, 50, 100, 250, 500 and 1000 millions are prepared.

There is no danger in giving it during an epidemic of influenza, but those already acutely infected should receive smaller doses, *e.g.*, $\frac{1}{5}$ or $\frac{1}{20}$ the normal. For prophylaxis begin with 100 millions, and follow in 7 days with 250 millions and increase up to 1000 millions.

Apparently vaccination with organisms other than the Pfeiffer bacillus has given the same doubtful results in prophylaxis as when mixed strains of the Pfeiffer bacillus have been employed. In view of the doubt regarding the causal relationship between *B. influenzæ* and the disease influenza it would be well to change the name of this organism to **Pfeiffer bacillus.**—Stitt.

The pros and cons of the matter in regard to epidemiology were fully dealt with in Vol. I., Edn. XIX., p. 923, *with lengthy bibliography.*

Some pathological aspects of influenzal pneumonia.—Sir Thomas Oliver Int. Conf. Trop. Am., '24,821. M. J. Rosenau considers Pfeiffer's bacillus clearly a secondary invader.—*ibid.*, 831.

War Office Conference Vaccine was revised to the following formula :—

B. Influenzæ	400 millions	in 1 Cc.
Streptococci	80 ,,	
Pneumococci	200 ,,	

It originally contained 60 millions of *B. Influenzæ.*

With the increase in proportion of the first mentioned, the vaccine may prove a powerful reinforcement to measures of protection. *Dose* $\frac{1}{2}$ Cc. with a further 1 Cc. after 10 days' interval. Table of results over wide area.—Sir W. B. Leishman, L. i./20,366.

Pfeiffer's organism causal of influenza in certain troops but not in others.—J. W. Edington, L. ii./20,340.

The following were the conclusions of the Conference on Vaccine therapy in Influenza.

Pfeiffer's Bacillus plays a most important part in the production of the symptoms and complications of the disease but the existence of some as yet undiscovered virus may be regarded as possible. Pneumococci and Streptococci are chiefly responsible for the gravity of the secondary pulmonary complications. The vaccine to be polyvalent and made from organisms isolated in the current epidemic to be sterilised at 55° C. for $\frac{1}{2}$ hour and contain 0·5% phenol.

Preferable to inoculate men before exposure to infection, but no harm in treating a body of men among whom influenza had already broken out but individuals not to be inoculated who already had fever or at the time suffering from catarrh. Further advice was :—

(a) *Children.* Not advisable to inoculate children under 3 *years of age.*
From 3 to 7 years—$\frac{1}{4}$ of the full doses.
From 7 to 10 years—$\frac{1}{2}$ of the full doses.
Above 16 years—full dose.

For treatment of severe cases and complications :—

(a) The vaccine is most likely to be of use in subacute and chronic cases. Here the initial dose should be 1/5 the first dose above.

(b) For severe cases of secondary broncho-pneumonia the vaccine is not advised but if it is desired to try it give 1/20 the first dose.—B.M.J. ii./18, 470,494 ; L. ii./18,565.

W. H. Wynn points out that 1000 million B. Influenzæ may confer immunity lasting several months, while that from 30 probably lasts but a few days. He employs 100 million each pneumococci and staphylococci and 50 million B. influenzæ, and after seven days double the amount—for prophylaxis. For *treatment* 50 million each pneumococci and streptococci and 30 million B. Influenzæ as soon after onset as possible. For broncho-pneumonia the same

dose, repeating or even increasing every other day or sometimes daily. 1½ million as advised by the Conference cannot be adequate.—L. ii./18,642,874. See also Pr., Feb. 1919 and B.M.J. i./20,254.

Investigation of Influenza epidemic. Photographic records of cultures on Crowe's Medium from throat and sputum. Constant presence of a pneumo-like streptococcus.—D. Thomson and R. Thomson, L. i./29,388.

Avoidance of a city area by an institution staff during the pandemic of 1918 resulted in no influenza.—E. A. Rainsford, L. i./29,635.

The possibility that a *virus* is the essential factor of influenza is considered in the system of Bacteriology in relation to Medicine (M.R.C.), but evidence is held to be unsatisfactory. The apparent identity of the **Koch-Weeks Bacillus** with *B. influenzæ* is commented on.—L. i./30,517.

CANINE DISTEMPER. Causative organism not isolated, but probably due to a filtrable virus analogous to that of equine influenza, swine fever and fowl plague. The *B. bronchisepticus* (Ferry) and various strains of staphylococcus and streptococcus are found.—L. ii./21,1038.

Detoxicated Anti-Influenza Vaccine.

As now advocated (1930) by D. and R. Thomson, consists of Influenzæ Streptococci (Thomson) 25,000 million, Hæmolytic Streptococci 2,500 million B. pneumosintes 2,500 million, B. influenza (Pfeiffer) 5,000 million, Pneumococci (5 types) 10,000 million, B. Friedlander 2,500 million, M. catarrhalis 2,500 million per Cc. *Dose* for prophylaxis 3 injections of 10, 20, and 50 thousand million at weekly intervals, and for treatment half these doses at 3 or 4 day intervals. **Detoxicated Anti-Coryza Vaccine** contains the same organisms in different proportions.

For a general description of Detoxicated Vaccines, see p. 899.

For further information on B. Influenzæ, vide Vol. II.

Pneumonia.

Sources of the Pneumococcus and Modes of Infection.—Pneumonia is rarely caused by auto-infection from the germ so commonly present in the throat in health, but is usually due to infection with pneumococci present in the air, dust, etc.

The specific antigenic substance from the pneumococcus is said to be a complex carbohydrate.—M.R.C. Rept., 1924-5.

Pneumococcus Vaccine (WIMPOLE INST.). **Ampoules** for Hypodermic use contain 25, 50, 100, 250, 500 and 1000 million organisms.

This Vaccine, besides being of service in pneumonia (it should be given early), is also used in empyema, especially in children (in adults, combination with a streptococcal vaccine may be advisable), in nasal and laryngeal, catarrh, asthma and bronchitis, periostitis, otitis, endometritis, and pyosalpinx, where initial doses of 100 millions may be employed, when due to this organism.

Dose.—10 millions initially is repeated or increased at intervals of seven days, according to clinical symptoms. Cases of delayed resolution in pneumonia are benefited by injections of 50 to 100 millions every 8–10 days, while routine treatment of all cases of pneumonia during the first week by doses of 25–50 millions whenever there is a rise in the temperature has been practised. In pneumococcal eye infections an initial dose of 250 millions is appropriate, and in pneumococcal septicæmia 10–25 millions.

It is probable that a large percentage of failures with stock vaccines is due to the vaccine not conforming in type with the infecting organism. Stock vaccines must be polyvalent and polyvalent in each of the types peculiar to the country. Autogenous vaccines are clearly preferable.

The percentage of cases of pneumonia due to bacteria other than pneumococcus is probably very much greater than is supposed. This was verified by the experience of the widespread epidemics in 1918–19 of so-called ' Spanish-flue.' In cases **where pneumonia is said to supervene upon influenza,** the infection is a double one from the beginning, and much may be done to prevent the pneumonic attack by giving 25–50 million doses of Pneumococcal Vaccine, combined with 50–100 millions of *B. Influenzæ,* as early as possible during the influenzal attack.

Prophylactic Inoculation. Sir A. E. Wright found that doses up to 40,000 million produced nothing more than a slight constitutional disturbance and slight rise in temperature. Lister advises a vaccine of four types containing 6,000 millions per Cc. of each type, making a total of 24,000 million per Cc. Of this 1 Cc. is given as initial dose twice repeated at intervals of 7 days. Borel holds similar views and he inoculated Senegalese troops in France with initial doses of 32,000 million without ill effect.

For white races work of investigators of the Rockefeller Institute shows that initial doses of 1,000 million each of the prevalent strains can be safely used and that with lower doses full immunity may not be secured. After 7 days either 1,000 or 2,000 million is given and a further 2,000 million 7 or 14 days later.

Prophylactic injections in the 1918 epidemic of 100 million pneumococci and streptococci and 50 million B. Influenzæ for the first dose and after a week double these doses clearly gave some measure of protection.—W. H. Wynn, L. i./18,874.

Vaccination of healthy young adults gives protection for a short time against lobar pneumonia due to the fixed types, but of no value in terminal or broncho-pneumonia.—W. H. Park, Int. Conf. Trop. Am. '24,834,856.

No advantage in using 1,000 millions of detoxicated vaccine if 100 millions of ordinary vaccine will produce the same or better results.—W. H. Wynn, L. ii./22,495.

Good results from doses of 100 million for an adult and 50 million for a child.—A. Erian, Pr., Dec. 23, 430.

Free from risk and appears to be of value in many incipient cases of pneumonia.—J. Stavely Dick, L. ii./25,1110.

Vaccine treatment of acute lobar pneumonia.—W. H. Wynn, B.M.J. ii./27,480. *See also* Sir James Barr, Pr. Feb. Mar., '28.

Types of Pneumococci. Work at the Rockefeller Hospital divided 454 cases of lobar pneumonia into 4 types. Type I. was responsible for 33%, Type II. for 29, Type III. for 13 and Type IV. for 20. Type IV. (now called Group X., *v. postea*) predominates in the pneumococci found in the mouths of 50% or more of normal persons.—B.M.J. i./18,57; i./18,351.

Types I. and II. are the strains most often present in epidemics. They are rarely found in the throats of those who have not been in contact with cases, the normal throat types usually belonging to Group IV.—Stitt, 1927.

Types of pneumococci in relation to disease. Group IV. in the eye, nose, and accessory sinuses. In acute otitis media and mastoiditis Type III. strains and Group IV. organisms found in about equal numbers.—J. T. Smeall, B.M.J. i./31,661.

Immediate pneumococcal typing.—R. R. Armstrong, B.M.J. i./32,187. A direct method of typing.—W. R. Logan and J. T. Smeall, *ibid.* 188.

Anti-pneumococcic Serum.—*Dose,* 20 to 50 Cc. into the lumbar or gluteal region as early as possible, repeated the following day, or until temperature falls.

Type I. Pneumococcic Serum.

As the types of pneumococci (see *antea*) have in general a high degree of specificity a homologous serum is necessary. The immune serum against Type I. is of great therapeutic value, but those corresponding to Type II. and others have not yet proved effective. The use of serum should therefore be confined to cases proved to be of

Type I. For details of manufacture of this serum see Cole & Moor Jl. Exp. Med., Baltimore, 1917, XXVI., 537-561, also other referenc per B.M.J. i./18,58. A dose of 90 to 100 Cc. of the serum repeat eight-hourly unless contraindicated till at least 250 Cc. have be given is advised : also a preliminary intradermal test to remove risk of anaphylaxis. If there is any indication of its existence t use of very small doses (initial 0·025 Cc.) intravenously slow injected is recommended every half-hour, doubling the dose ea time until 25 Cc. have been given.

Ministry of Health Report No. 13 (1922) confirms that it has not yet be found possible to prepare a serum for cases of pneumonia not due to Type. The pneumococcus and Pfeiffer's bacillus are both common inhabitants of t upper respiratory tract, non-pathogenic and harmless saprophytes apparently healthy people. They are both intimately associated with 'colc but the pathogenicity of Pfeiffer's bacillus is uncertain. It is, however, kno to be toxic and its presence cannot be regarded as innocuous. It will probab take some years to prove whether Pfeiffer's bacillus is, or is not, the cau of influenza.

CONFERENCE ON STANDARDISATION. The Conference accepted the Americ Types I., II. and III., as standards for international purposes. The ter 'Group X' to replace 'Type IV.' (a collection of heterogeneous strains). L. ii./22,1293.

Bacteriological and clinical observations on pneumonia and empyema with specific reference to the pneumococcus and to serum treatment. Me Res. Council, Special Report Series 79—Type I. Serum investigated clinica gave encouraging results in 6 cases.—B.M.J. ii./23,618.

Felton's Serum of value in lobar pneumonia of Types I. and II.—J. Cow and co-workers, L. ii./30,1387-1394.

Pane's Antipneumococcic Serum.

Supplied in two strengths, Nos. 1 and 2.

Dose.—15 Cc. of No. 1 repeated, if necessary, in 24 hours, is of valu especially in severe cases with high temperature and rapid pulse. Improv tone of pulse where there is great heart weakness. The toxin secreted by t coccus appears to act on the muscles of the heart and weakens it.

Site of Injection.—Subcutaneous tissue of the abdomen.

If patient very weak the Serum may be given per rectum—the bowel bei previously washed out by an enema of warm salt solution.

Diagnosis.—In suspected cases examine the fauces for pneumococci. T use of antiseptic gargles may check further infection.

Pneumococcal Meningitis treated by Pane's Antipneumococcic Seru *per os.* 5 Cc. doses *mane,* no food being given for two hours before or tw hours after. Dose *per os* double that necessary hypodermically. Lumb puncture simplified by Eucaine and Adrenalin hypodermically.—W. Broa bent, B.M.J. ii./16,586.

Pneumonia treated with serum intravenously and Adrenalin. 70% clear up rapidly.—Renaud, B.M.J.E. ii./21,9.

Pyorrhœa Alveolaris.—It is probable that in very early cas of pyorrhœa alveolaris the bacteriology of the condition may b a relatively simple one, *Streptococci, Pneumococci, Staphylococ* and *M. Catarrhalis* alone or in combination being probable causes later on, secondary infection by spirochetes, streptothrices an vibrios inevitably occurs and these may entirely replace the origin invaders. Observations have shown that **Vincent's Fusifor Bacillus** alone may be responsible for most intractable ulcer while cultures of the above organisms in liquid media are intense toxic ; the view, therefore, that they may be responsible not onl for the local but also for the general toxic symptoms in advance cases of pyorrhœa is more than justified.

H. K. Box's view of the pathology.—L. i./25,84,153.

Autogenous vaccines of advantage in pyorrhœa alveolaris when associated with energetic local treatment, but useless without it. —G. B. Pritchard, L. i./27,92.

✱**Genozo** (T.M. 488639 and 493518) **Tooth Paste.**
A neutral preparation containing a detoxicated vaccine, to develop resistance against pyorrhœa and purulent infections.

Relapsing Fever.—See *Vol. II.*, also Salvarsan chapter.

Rheumatism.

Pathogenesis and Treatment of Rheumatic Fever (and Chorea).

Rheumatic Fever—an acute specific disease. *Diplococcus Rheumaticus*,—an organism found by Poynton and Paine growing in short chains, Gram + , forms Lactic, Formic, and Acetic Acids and curdles milk—is the supposed cause of the disease. The organism has a strong vitality on Blood Agar. It may be shown in all rheumatic lesions, though with difficulty.

It is believed that the *S. Rheumaticus* is a variety of *S. fæcalis*, and other streptococci have been found in cases of rheumatism, but *S. Rheumaticus* is the most common variety.

The organism produces ½ Gm. of Formic Acid (also Acetic Acid) from a litre of culture. The urine of rheumatic patients contains up to 0·2 Gm. in a day's urine. Salicylates administered decrease the amount. This acid is not known to be produced in like amount by streptococci from other sources.

Streptococcus Rheumaticus Vaccine (Wimpole Institute) for complications of rheumatic fever. *Initial dose* 5 to 10 millions.

In doubtful cases of rheumatic arthritis a dose of 250 to 500 millions of *Streptococcus Rheumaticus* may be given diagnostically, and the temperature observed every four hours for 24 hours; a marked temperature or local reaction will assist greatly in establishing the diagnosis. **Ampoules** containing doses of 5, 10, 25, 50, 100, and 250 millions are prepared.

Extreme caution in the use of this Vaccine is necessary. Even 500,000 may cause a most unpleasant reaction and until the urine is free from organisms more than 5 million can seldom be given.

Disease of the Mouth associated with Rheumatoid Arthritis.—Autogenous Vaccines effected amelioration.—Sir Kenneth Goadby, L. i./11,639.

Rheumatoid arthritis is due to *Staphylococcus epidermidis albus* (var. *deformans*). Vaccine given with encouraging results. The initial dose in the majority of cases was 500,000. The interval with small doses was 3 days, with large doses a week.—H. Warren Crowe, B.M.J. ii./20,815.

Vaccine therapy should never be used until the focus of infection has been removed as far as possible.—Sir W. Willcox, B.M.J. i./26,1045.

The initial dose should be one million and after the first three or four doses the increase should be 25 or 50% of the previous dose, the interval between the first few doses being 3 or 4 days and later a week.—K. Stone, Pr., Sept. '27,183.

Rapid improvement following subcutaneous injections of *B. fallax* vaccine. *B. fallax* is an organism occasionally isolated from gangrenous wounds and cases of puerperal sepsis. Advisable to add the organism to autogenous vaccines in treatment of chronic arthritis, especially when joints have been damaged previously by injury or are the seat of disease non-pyrexial and insidious from the onset.—J. and N. Mutch, L. i./27,1022.

S. viridans the commonest organism isolated from rheumatic patients—whether teeth, tonsils, or bowel.—L. i./29,1016.

A questionnaire sent to all patients treated during the year 1928–1929 at the Devonshire Hospital, Buxton, showed that there was no evidence of greater benefit in those treated with autogenous vaccines than in the vaccine

group as a whole and it would appear that vaccines show no better prospe of improvement or cure of infective arthritis than other methods of treatmer —P. M. Congdon, L. i./32,180.

Compulsory notification of acute rheumatism in Kensington justified. B.M.J. i./30,707.

B. Coli Vaccine intravenously in rheumatoid arthritis, see B. Coli.

Septicæmia, Anti-Streptococcic Serum.

Dose.—30 Cc. early in any form of septicæmia, and repeated eve six hours if necessary. Injections are made under the skin of t abdomen or flank or at the seat of inflammation, if any, as in erysip las, so as to produce good local effect. Usually supplied in 10 C phials.

The preparation of the **Lister Institute** introduces a large numb of strains (hæmolytic, non-hæmolytic and *S. fæcalis*). They a obtained from a number of infections, *e.g.*, erysipelas, septicæmi endocarditis, uterine infections, influenza, appendicitis, etc.

Special Anti-streptococcic Sera for use in **Erysipelas, Puerper Fever, Scarlatina, Endocarditis and Rheumatic Fever,** are obtai able.

PUERPERAL FEVER and the varied forms of septicæmic infection followi childbirth have been treated in many instances with it with good results.

Serotherapy results in puerperal infection are inconstant. Preferably giv intravenously in the earliest stages: also used locally—50 Cc. introduc into uterine cavity daily. To prevent acclimatisation of infective organis large doses (60–100 Cc.) must be given for the first three or four days and t treatment then suspended. In benign cases, vaccines are preferable, but th are useless and even dangerous in profound general depression and asthen very acute septicæmia, or with cardiac, renal, or adrenal deficiency. Do still largely empirical, but preferable to begin with small ones.—B.M.J. i./25,24.

Anti-streptococcic serum in septicæmia hardly justifiable—serum sickne An effective method of immunising donors needed.—L. Colebrook, B.M. i./25,659.

Antistrepto Serum, 50 to 70 Cc. during labour, or a few days prior to ons if trouble anticipated. Radiostoleum in addition.—S. J. Cameron and Thomson, B.M.J. i./31,350.

Streptococcic septicæmia treated with Scarlet Fever Antitoxic Seru S. hæmolyticus isolated. Given subcutaneously or intramuscularly, and nev more than 20 Cc. at a time. Burt-White never gives less than 20 Cc. a always intravenously.—A. B. Rosher, L. i./30,129.

Morbidity in puerperal sepsis mainly due to a single cause, the *Streptococc pyogenes*. Vaccines a failure.—R. R. Armstrong and W. Shaw, B.M.J. i 28,1084.

Indicated in simple septicæmia or sapræmia. Erysipelas, endocardit carbuncle and acute rheumatism have been treated with it.

Scarlet Fever Antitoxin. *Syn.* SCARLET FEVER STREPTOCOCC ANTITOXIN CONCENTRATED (Globulin).

Dose for treatment.—10 Cc. usually establishes normal temperatu in 36 hours and the quarantine period is shortened in many cas by nearly 50%. If given early, it generally arrests the progress complications and may lessen the severity of complications alread developed.

Prophylaxis.—2·5 Cc. for children of 5 to 15 may confer passiv immunity for 10 to 14 days.

Diagnosis. (SCHULTZ-CHARLTON REACTION.)—The diluted ant toxin is injected intradermally into an area where the suspected ra

is most marked and will, in the case of scarlet fever, produce the characteristic rash-fading.

Scarlet fever, confirmed by a marked Schultz-Charlton reaction (intradermic injection into the rash of 0·2 Cc. horse scarlet fever antitoxin) and a positive Dick test, treated by 25 Cc. unconcentrated scarlet fever antitoxin intramuscularly.—E. H. R. Harries and co-workers, B.M.J. i./26,864.

Scarlet Fever. Prophylactic inoculation. The subcutaneous injection of 0·0001 Cc. of the blood of a scarlet fever patient into children produces no reaction but confers a degree of active immunity sufficient to prevent occurrence of the disease on introduction of the virus contained in 0·15 Cc. of blood.—I. Takahashi, L. ii./21,645.

Immunity conferred by a toxin which had been detoxicated by the addition of an equal volume of 2% Sodium Ricinoleate solution. There were only negligible reactions and the preparation has the advantage over the ordinary toxin-antitoxin mixture of not sensitising the child to Horse Serum. Since it is possible to effect immunisation in one dose, the chief objection to active use against diphtheria and scarlet fever is removed.—W. P. Larson, Minnesota, L. ii./25,824. See also L. ii./26,1231.

Specific antitoxin in the treatment of scarlet fever.—A. G. Robb, B.M.J. i./26,11 ; *ibid.* i./26,26.

By injection at 5 to 14-day intervals of gradually increasing doses of 1 in 1000 dilution of scarlet fever toxin (commencing with 0·2 Cc.) the majority of Dick-positive reactions are rendered Dick-negative without ill-effects, but larger injections necessary to confer lasting immunity in cases originally strongly Dick-positive.—W. T. Benson and G. W. Simpson, L. i./27,283 ; see also D. S. Sutherland, *ibid.* 291.

The important questions as to the most suitable doses of toxin to administer, the total amount which should be given, and the duration of immunity resulting, remain as yet unanswered.—Stitt.

Intranasal immunisation against scarlet fever by application of toxin to the nostrils.—B. A. Peters and S. F. Allison, L. i./29,1035.

Intravenous antitoxin in scarlet fever. 10 to 20 Cc. dose in acute stage stops the acute process in a few hours.—H. S. Banks and J. C. H. Mackenzie, L. i./29,381 ; H. S. Banks, L. i./29,1248.

Further on Dick Test and Prophylaxis, see Vol. II.

Control of scarlet fever in a children's hospital.—D. McClean, L. i./27,483.

Autogenous Vaccine may be of value.

Anti-streptococcic Serum has been a failure in a large number of cases of erysipelas, pyæmia, etc. The streptococcus is a very large genus.

Scarlatina Antitoxic serum used in puerperal septicæmia with mortality 29·6%. In every case S. pyogenes hæmolyticus was found.—H. Burt-White, L. i./30,19.

None of the methods at present available is sufficiently accurate to allow a uniformity in the dosage of scarlatinal antitoxin in any way approaching that of diphtheria antitoxin.—R. Cruickshank, L. ii./28,275.

Streptococcus Vaccine may be employed in localised infections, as erysipelas, lymphangitis, ulcers, sinuses, tonsillitis, adenitis and mastitis ; also in asthma and bronchitis, and in generalised infections such as septicæmia and pyæmia, provided the Streptococcus has been proved to be responsible. *Initial dose* in very acute and in generalised infections should be 5 or at the most 25 millions ; in more chronic conditions a dose of 25 to 50 millions is suitable. **Ampoules** for Hypodermic use are supplied containing 5, 10, 25, 50, 100, 02 and 500 millions.

Septic Sores and Nile Boils well treated with Streptococcic Vaccine in the former and Staphylococcic in the latter.—H. Warren Crowe, L. ii./18,667.

Hæmolytic Streptococci often present in throat swabbings especially where tonsils are enlarged, also in cultures of the pharynx but not in gum margin or in nose. Largely prevalent in scarlet fever, measles, influenza and lobar pneumonia. In respiratory complications the actual cause of the disease

may so act on the respiratory mucous membrane as to render it suscepti to attack by these streptococci.—J. M. Beattie, B.M.J. ii./21,786. See a J. H. Dible, *ibid.* 789.

Infection of the teeth and gums: a useful classification of the various co plications arising. Intestinal infections frequently result from dental inf tion. *Plombières colon irrigations* or autogenous vaccines made from t streptococci found in the teeth and intestine may be of value.—Sir Willi Willcox, B.M.J. i./23,53.

PUERPERAL FEVER.—*Autogenous Streptococcus Vaccine* found efficient in B.M.J. ii./22,644. Previous refs. in 18th Edn., p. 909.

Puerperal septicæmia well treated with local dressings of gauze impregnat with streptococci, the dressings being changed from three to five times in hours. Not less than three dressings were applied.—Presse Med., per A.M.A. ii./25,780.

Operations on the lower part of the alimentary tract liable to suffer inf tion. Ten days before give a vaccine of streptococci and B. Coli, repeat three days before the operation, and on the night before, 8 Cc. of 2% Nuclei Acid.—P. P. D. Wilkie, B.M.J. ii./23,189.

ERYTHEMA NODOSUM treated by antistreptococcic serum.—A. H. Cart B.M.J. ii./23,414.

OSTEO-ARTHRITIS of the hip joint treated by vaccines made from streptoco obtained from foci of infection.—H. Warren-Crowe, B.M.J. ii./26,834.

Streptococcus Vaccine and Staphylococcus Vaccine, combined with ac bacillus, have no therapeutic value—omitted from N.N.R.—Y.B.P., '26,2

Milk epidemic at Brighton Jan. 1930. *Streptococcus brevis* isolated fr the throat and *S. longus non-hæmolyticus* from gland in the neck on incisio The condition corresponded to what is known as Dupuytren s phlegmo Infection traced to milk—a milker suffering from some pyogenic streptococ condition such as whitlow.—A. Cowan Guthrie, Med. World, Nov. 28, '30.

Coley's Fluid.

Contains the combined toxins of Streptococcus Erysipelas and B. prodigiosu Supplied by the Lister Institute in 2 Cc. phials. As now prepared is a mod fication of the original method.

Dose.—Inject a dose daily into tumour, or neighbourhood of tumou beginning with 0·25 minim into the tumour, or 0·5 minim elsewhere, and little or no reaction increase by 0·25 or 0·5 minim daily till a rise of tempera ture to 102–104° F. is reached. For first few doses dilute with boiled wat to ensure accurate dosage. If depression follows injections give at long intervals.

Uses.—In inoperable cases of malignant disease, especially sarcoma. Co tinue injections till reaction has calmed down and temperature fallen.

Mixed-cell sarcoma treated locally, excision and Coley's Fluid ½ to 3 mini doses successful.—B.M.J. ii./13,1484.

The treatment was not given a fair trial in London, but Coley's claims t cure 10 to 12% of inoperable sarcomas were undoubtedly valid. Three case saved by it.—J. McNamara, B.M.J. i./28,1134.

Cases of lymphosarcoma and Hodgkin's disease respond readily. The diseases should no longer be regarded as absolutely hopeless.—Ann. Surger Oct., 1928.

Staphylococcus Vaccine (*S. albus*, *S. aureus* and *S. citreus*) als *Mixed Vaccine*—*S. Albus* and *S. Aureus* in equal proportion.

Dose.—Initial 100 millions, increased to 1000 or even 500 millions.

In cases of acne, *Staphylococcus albus* is commonly associated with the Acne Bacillus (*q.v.*). In boils, carbuncles, sycosis, ulcers, and sinuses generally, and in acute generalised infections, such as pyæmia, ulcerative endocarditis, septicæmia, and peritonitis, either *S. Albus* or *S. aureus* may be found, but the *S. aureus* is relatively the more common. The mixed vaccine may if necessary be used.

BOILS.—In nine cases out of ten 100 million Staphylococci will cure.—Si A. E. Wright.

FURUNCULOSIS.—If no improvement after three or four injections make an autogenous vaccine.—Athole Ross, Pr., July, '13,100.

ECZEMA, ACUTE.—When the suppuration is not controllable by ordinary means and the stage of "chronic" pus infection is reached has been well treated.

Staphylococcic toxins. Burnet and Kellaway's investigations.—L. ii./30, 975.

Tetanus Antitoxin.

(*Special provisions are made as to the manufacture of this Antitoxin under the Therap. Subs. Act* 1925, *and Regns.* 1927.)

The **Lister Institute** advises as follows :—

(1) ***In Acute Tetanus.*** At first sign of tetanus give very large doses energetically and continuously—16,000 to 20,000 U.S.A. units beneath the spinal arachnoid (in the usual position for lumbar puncture) and the same amount intramuscularly on the outer side of the thigh into the body of the vastus externus muscle. If no improvement at end of 12 to 18 hours repeat the doses once a day for 3 to 4 days. Later diminished doses subcutaneously, but patient is not out of danger for a long period.

Warm the serum first to 99 or 100° *F. before injecting.*

Rise in temperature with rashes which should pass off.

(2) ***Premonitory Symptoms.***

General restlessness suddenly changing to a desire for rest and vice versa. Unreasonable outbursts of temper. Increased nervousness. Sleeplessness with distressing dreams and may be nightly delirium. Temporary giddiness, violent headache, excessive yawning, diffuse backache. Trembling of the tongue which is put out to one side. Some local swelling, without redness, of the injured member and throbbing of its arteries notwithstanding that the limb is raised. Slight jerking may follow pressure on the flexor tendons and increased irritability of the muscles. A profuse sweating and darting pain in various parts. Difficulty in micturition, due to spasm of the sphincter vesicæ, which may last from a few minutes to half an hour. Changes in the facial appearance, the patient *looks* anxious, through there is as yet no *risus sardonicus.* Increased flow of saliva, spasmodic cough. Earache, stiffness at angle of jaw. Difficulty in swallowing. Tremors and clonic spasms which are not painful and may not attract attention. Pain persisting after muscular contraction induced by effort.

(3) ***Prophylactic Use of Antitoxin and Treatment of Wound.***

Dose.—At least 500 U.S.A. units to be given *under the skin of abdomen or flank* in every case of injury where possibility of B. Tetani infection. If there is soiling of the wound or there is much dead tissue in a wound which is several days old before observation give 1500 to 3000 units intramuscularly 3 to 6 hours before operation if the latter is needed. Use Iodine in the local treatment of the wound as it has strong destructive action on Tetanus Toxin. Intramuscular injections are preferably given in the outer side of the thigh (into the body of the vastus externus muscle).

U.S. X. has an **Antitoxin Tetanicum Crudum.** *Syn.* Antitetanic Serum, having a potency of not less than 150 units per Cc. : and a *purified* serum, **Antitoxinum Tetanicum,** with a potency of not less than 300 units per Cc. The latter is a solution of the antitoxin-bearing globulins. In both products the amount of preservative must not exceed 0·5% Phenol, or 0·4% Cresol.

Dose.—(Hypodermic) of either of these 10,000 units. Protective 1500 units.

Experience gained in the first year of war confirmed the opinion

that 500 to 1000 U.S.A. units is sufficient prophylactic dose for th majority of cases. In severe wounds repeat once or twice at in tervals of a week.—A. T. MacConkey.

P. Jap. IV. has Liquid Serum, with not less than 5 Behring units in 1 C also Dried Serum of potency at least 50 Behring units in 1 Gm.

P. Ital. V., has 'Natural' Serum, liquid containing 3 Behring units or 15 Rosenau-Anderson units per Cc., also Dried Serum 30 and 1500 uni respectively.

For treatment at least 3000 units intrathecally (intraspinally). At th same time 10,000 units to 20,000 units intravenously and subcutaneousl To be repeated as frequently as the course of the disease seems to demand.— Sir D. Bruce, B.M.J. ii./15,593. *See* also below.

W.O. Committee Memorandum.—*The best results are obtained by* ***in trathecal (intraspinal) injection*** at the earliest stage repeated f three or five days and supplemented by intramuscular doses. When opera ing at the site of wounds give as prophylactic 500 units or more intramuscular two days before the operation. Intravenous injections should not be mad owing to risks of anaphylaxis.—Detailed method of giving intrathecal inje tion.—B.M.J. ii./16,647,660. Sir D. Bruce, L. i./17,680,986, see also F. V Andrews and T. J. Horder, *ibid.* 682, F. Golla, *ibid.* 686 ; M. Greenwood, *ibi* 687 ; J. Gow, *ibid.* 689.

Effectual daily dose is about 10,000 to 12,000 units—the bulk of it to b given intravenously. There is grave danger in interfering with the infecte surface of a wound when tetanus has declared itself. This does not apply t amputation above the site of injury.—R. G. Abercrombie, B.M.J. i./16,339.

The duration of the complete passive immunity conferred by a dose o Antitoxin is short—enormous doses would have to be given to obtain im munity for a *length* of time. 250 U.S.A. units would protect a man—weigh for weight as compared with a guinea-pig—for a week. 500 units woul allow for the man being twice as susceptible.—A. T. MacConkey and A Homer, L. i./17,259.

Anaphylactic Shock.—The danger of this is negligible when the prophy lactic dose is contained in such a small quantity as 2 to 3 Cc. of horse serum In curative treatment where massive doses have to be given the case is differen Small subcutaneous doses rapidly increased remove risks.—L. i./17,105,114.

Prophylactic injection prolongs the incubation period enormously on in fection. Tetanus may therefore occur after wounds have healed. Five mil cases treated intramuscularly and subcutaneously, all recovered. Six case intrathecally. Fourteen intravenously—some of these by a single dose o 3000 U.S.A. units. 13 recovered.—H. R. Dean, L. i./17,673.

Delayed tetanus treated with large doses of serum—a total of 236,500 unit given intrathecally after lumbar puncture. Acts quicker than intramuscula or subcutaneous.—S. E. Denyer, L. i./21,1356.

The toxin of Tetanus is transported to the central nervous system alon the motor nerves. Therapeutic use of Antitoxin is fully justified and indee imperative.—F. Ransom, L. ii./17,928.

Intramuscular route and large doses in tetanus needed, with Chloretom (15 grains in Olive Oil per rectum) as a depressant of reflex excitability.— D. Bell, B.M.J. i./31,75.

Better results obtained by giving large doses (50–100 Cc.) subcutaneousl by the intraspinal route *under Chloroform anæsthesia*, ending with subarachnoi injection of 10–30 Cc. The Chloroform impregnates the lipoids of the nervou system rendering it impossible for the toxins to become fixed—an exampl of 'phylaxis.'—René Cruchet, B.M.J. i./32,86.

Preparation of Tetanus Antitoxin.

The method of preparing Tetanus antitoxin consists in rendering animals im mune to the tetanic poison by repeated inoculations of increasing quantitie of the tetanus toxin, after first protecting them with a large dose of tetanu antitoxin. The animals are then bled and the serum prepared and preserved

Units of Immunity.—The U.S.A. unit established by a Decree of Congres is commonly employed. It consists of ten times that amount of Antitoxi which when mixed with the Standard Test dose of toxin and injected be neath the skin of a guinea pig weighing 340 to 370 Gm. saves the life of th animal for more than 96 hours. For further information see McConkey.— B.M.J. ii./14,609, and ii./15,849. Intern. Conference at Paris.—L. ii./22,129

The Commission on the Standardisation of Serum, Serological Reactions and Biological Products under the League of Nations proposed to adopt the following anti-tetanic unit: "The unit is to be determined with a standard serum in such a way that its relation to the American unit is exactly 2 International to 1 American unit."—B.M.J. ii./28,111.

Dry pulverised Anti-tetanus Serum as a Wound Dressing.—This is dusted on wounds which may have become infected with dust, mud, etc. Infection may thus be prevented; in addition apply antiseptic dressing. Tetanus may also result in new-born children owing to infection at the umbilicus after birth—sometimes from Fuller's Earth.—W. W. W.

Intra-Cerebral Injection of Anti-Tetanic Serum has been practised.

The injection must be concentrated and free from antiseptic. A blunt needle is used.

Subdural injections of large doses encouraging. 1500 units given through a drill in the cranium in addition to intraspinal and intramuscular injections. One patient received 36,000 units intravenously and intramuscularly in a week.—B.M.J. i./16,620.

16,000 units injected into the cisterna magna cured tetanus after lumbar route failed.—T. O'Carroll, B.M.J. i./31,74.

It has been determined that tetanus spores free from toxin and extraneous micro-organisms do not produce tetanus, but the spores remain quiescent in the tissues for long periods, and when an **Injection of Quinine** or **Calcium Chloride** or **Lactic Acid** is given, necrosis of the tissues surrounding the site of injection occurs and should any of these dormant bacteria gain access to this locality they may light into activity and produce tetanus.—F. H. Teale.

For **Veterinary use** the Lister Institute supply 1500 units for prophylaxis.

The horse injected with Tetanus Antitoxin is not rendered *permanently* immune. *Protection* is a matter of weeks or months at the outside.

B. fallax. A rather rare anaerobe of war wounds, producing a soluble toxin giving rise to œdema. Not a very pathogenic organism.—Stitt.

Trypanosomiasis. *Vide Vol. II.*

Tuberculosis.

Tuberculous Milk as source of Infection, vide Vol. II. under B. Tuberculosis. See also Nutrimenta, Boiled v. Unboiled Milk. Vol. I.

Tuberculosis Notification Order.—This order was designed to complete the organisation for ensuring notification of all cases to health authorities. A medical practitioner is not required to notify any case which has already to his knowledge been notified either under this Order, under the Poor Law Order (1908), or under the Hospitals Order, if the notification has been made to the M.O.H. of the Area within which the patient resides; but if a patient who has been notified in the area of one Sanitary Authority removes into another a fresh notification to the M.O.H. of the new area should be given. Patients in a prison, reformatory, school or lunatic asylum and patients in a Poor Law Institution, or under the care of a Poor Law District M.O., are not to be notified under this Order, nor are applicants for life insurance, nor a passenger or member of the crew of an emigrant ship, nor an inmate of any building, ship, vessel, boat, cart, van, shed, or similar structure belonging to His Majesty the King. Multiple notification results but steps are taken to prevent it affecting statistics on prevalence.

Australian quarantine.—Any passenger deemed to be suffering from tuberculosis, even in an early stage, is usually prohibited from landing—or a heavy bond is exacted binding him to leave if not recovered at the end of six months.

Tuberculosis Order 1925 (*Regarding Cows*).

Every cow suffering from tuberculosis of the udder, or giving tubercular milk, and every bovine animal suffering from tuberculous emaciation, or chronic cough, and showing definite clinical signs of tuberculosis is to be destroyed. Every person in charge of such an animal is to notify a police constable, or inspector of the local authority. Veterinary surgeons in private practice to notify such cases to inspector of local authority. Owing to lack of co-ordination between Agricultural Committees and Public Health Committees, very little will be accomplished in the way of reducing bovine tuberculosis under the Order. Whole-time veterinary surgeons necessary for every county of any size.—W. G. Savage, L. i./27,722-725.

PROGRESS OF INFECTION IN PHTHISIS.—Tuberculosis causes immunity—the resistance is specific—the apparently strong may succumb to it. There

is a menacing danger of the infection of new areas; absolute rest in bed in the early stages will avoid it.

Some degree of immunity to bovine tuberculosis can be induced in calves by injecting them with cultures of the human type. Similarly in man the disease tends to confer some immunity, and it is on the acquisition of the new or improved powers of resistance which are the cause of the immunity slight though may be, that the hope of recovery mainly depends. In man as in the ox, the severity of a tuberculous infection is largely determined by the number of Bacilli gaining entrance at the start. In its tendency to produce immunity tuberculosis differs from other diseases only in degree. During the course of infection the powers of resistance are constantly increasing.

Immunisation of cattle against tuberculosis.—L. i./31,879.

A tuberculosis patient, under a doctor, will improve for a time, no matter what drugs, vaccines, or treatment be employed, owing to the nursing, regulation of food, exercise and sleep, etc. If this were recognised, 'treatments' would diminish. Records must be kept for years before the value of a remedy can be gauged.—W. E. Dixon, B.M.J. i./25,813,815.

ÆTIOLOGY, PREVENTION AND TREATMENT. Every sanatorium should realise that sputum—contaminated dust of dwellings, streets, buildings and public places, inhaled and ingested with the air and in food—is the most frequent cause. "It is a filth disease" (Simon).—Sir R. Douglas Powell, Pr., Jan. 1922, p. 1.

Tuberculosis in Wales. Mortality rate on the whole higher. More acute than in England. Many leave their country homes for London or for the big industrial centres of Wales itself and many get infected with tuberculosis and go home again to die—perhaps infecting a whole household before the end. Nature is gradually getting rid of tuberculosis by a process of unconscious vaccination.—S. Lyle Cummins, B.M.J. i./22,338.

During the war 40,000 men were discharged from the British army with diagnosis of pulmonary tuberculosis. This was not due to recent infection.—A. Latham, L. i./22,263.

Retrospect of 40 years in tuberculosis. In the matter of treatment the method of inhalation of antiseptics thought to be the most futile. With regard to Tuberculin there is little hope of the discovery of any drug that can destroy the bacillus without damaging the delicate tissue cells—or reach the microbe entrenched in masses of necrotic tissue, but 'success may ultimately be achieved on these lines.'—Percy Kidd, L. ii./22,1211.

Dogs as carriers of disease to man from animal parasites and tuberculosis (and rabies). Tuberculosis in the dog can be diagnosed by tuberculin injections.—T. W. M. Cameron, L. i./22,564.

The share of the sun in prevention and treatment of tuberculosis.—A. Rollier, B.M.J. ii./22,741.

League of Nations Report on mortality from tuberculosis in various countries during the last 50 to 80 years.—B.M.J. i./31,1127.

In Glasgow 12% of the population live in one-apartment houses and 48% in two apartments. Domiciliary treatment of advanced cases in such conditions impossible. Preventive methods employed. Death-rate there from phthisis now a quarter of what it was in 1870.—A. S. MacGregor, B.M.J. ii./30,725.

About 36,000 people die from tuberculosis every year in England and Wales though the death-rate in 1929 was 44% less than in 1918. ***Next to nothing is done for after-care,*** though money is devoted to new Sanatoria.—B.M.J. i./30,836.

Printers have a high mortality from tuberculosis, though a low general death rate.—L. i./29,679.

Fowler's suggestion to inoculate milk with live tubercle bacilli as a prophylactic against tuberculosis never thought of.—F. N. Moos, L. i./30,832.

The Indian populations of Manitoba and Saskatchewan are literally soaked in tuberculosis.—A. S. MacGregor, B.M.J. ii./30,725.

Outlook on tuberculosis.—Sir R. W. Philip and others, B.M.J. i./31,239.

For the relationship between human and other forms of Tuberculosis and tests to distinguish types of B. tuberculosis, see Vol. II.

Hospitals for Treatment of Tuberculosis. The Insurance Act method of dealing with tuberculosis has failed. The lines of prevention laid down are impossible. If the respiratory route is the one by which human tuberculosis is engendered we have no right to ask a number of perfectly healthy men and

women to act as physicians, nurses, etc., etc., in institutions for the care of tuberculous pulmonary disease.

Adequate sanatorium treatment for the poor—other than those of the so-called early cases of pulmonary tuberculosis—does not exist. The ultimate fate of these cases is sad in the extreme—they return from a stay in the fresh air to a bed-ridden end under the care of health visitors and tuberculosis officers.

The other way of tackling the tuberculosis problem, however, is based on the view that *every* member of society is infected with the tubercle bacillus in early life and only those develop the disease, the soil of whose bodies is non-resistant. The great purpose of the Insurance Act based as it is on assumptions rather than on fact, of trying to stamp out tuberculosis by prevention, is rendered null and void by making the advanced tuberculous subject live in his own home. The *advanced* consumptive needs more help than he gets.

The paper concludes with an eloquent appeal for the bed-ridden men, women and children sent home for domiciliary treatment, a burden to themselves and their relatives. 'Observation' Hospitals are needed for doubtful cases as also Invalid Homes where those suffering from pulmonary tuberculosis may be nursed and treated until they are fit to earn their living or until they die. These Invalid Homes need not be in the country. They may in fact be in the heart of populous centres and therefore near their families without being a burden to them.—H. Batty Shaw, B.M.J. ii./19,97.

Tuberculins.

There is no consensus of opinion either as regards the proper variety of Tuberculin to use or the correct dose to employ. The preparations now described are **Old Tuberculin, Albumose-Free Tuberculin or T.A.F., Tuberculin T.R., Bacillary Emulsion or B.E., Beranek's Tuberculin, Raw's Vaccine,** and certain other modifications.

Tuberculin, Old, Tuberculin Koch. P.G. VI. That of **P. Belg. IV.** and **P. Ital. V.** is similar.

This is an amber coloured liquid—a mature glycerin broth culture of the tubercle bacillus (*typus humanus*) concentrated to $\frac{1}{10}$ its volume, and filtered, with the addition of 0·5% Phenol. It is supplied in 1 Cc. bottles. Dilutions are made with 0·5% Phenol.

The Therap. Subs. Regns. 1927 *define Old Tuberculin as proper name for this; if with the suffix 'T' the tuberculin has been made from a case of human infection, while 'P.T.' indicates made from bovine infection.*

Standardisation. According to the **Therap. Subs.. Regns. 1927** the Tuberculin is compared with a standard preparation kept in the Nat. Inst. Med. Research, Hampstead. Each batch is to be tested for potency by observing its specific toxicity for guinea-pigs or other animals infected with *B. tuberculosis.* Further each batch is to be tested for non-specific toxicity and for sterility.

The precipitin test is not good for standardisation.—Von Pirquet tests in agreement.—C. C. Okell and co-workers, L. i./26,433..

Standard Tuberculin for International Use established by Permanent Standards Commission of the League of Nations. Standard preserved at the State Serum Institute, Copenhagen.—B.M.J. ii./31,810.

It has been used (*a*) as a ***Diagnostic*** both in man and beast, see p. 935, and (*b*) for treatment, but this is now little used for the purpose. Tuberculin A.F., *q.v.*, replaces it. It is however still used in the 'Dispensary' treatment of Camac Wilkinson—*q.v.*

Effects of Injection.

The tuberculin seems to act upon the tuberculous lesions, and even partly destroys them—it is not definitely destructive to the tubercle bacilli—or their surroundings, and subsequently there is a risk of

further symptoms from blood poisoning dependent on this. The tuberculin may cause a serious fall in blood pressure, leading even to a fatal issue; in other cases there have been congestion and hæmorrhage or other irritant effects have been produced.

Contra-indications for the injection are laryngo-tuberculosis, cardiac troubles, diabetes, nephritis and pregnancy. In epilepsy and neurasthenia should be given with the greatest caution.

The general reaction usually sets in about 8 to 16 hours after the injection —more or less severe attack of shivering, with headache and pains in the limbs.

At the point of injection, redness appears after 1 to 2 hours, and gradually an infiltration shows itself varying in size from that of a farthing to that of half-a-crown, the absorption of which may take several days.

The height of the reaction is indicated by a profuse outbreak of sweating, a lessening of all the other symptoms and a more or less speedy return of the temperature to normal. Generally the entire reaction is over in 24 to 36 hours. There may be slight lassitude, and in the case of phthisis an increased expectoration, disappearing in a few days.

In lupus patients, besides the general, a marked local reaction sets in.

Sequels to the injection of Tuberculin. E. Hoke states he has seen herpes zoster, Quincke's œdema, periodontitis, urticaria, polyneuritis, fatal anaphylactic shock follow use of Old Tuberculin.—per Clin. Jl., Dec. 26/23,622.

TUBERCULOUS MENINGITIS treated with daily intrathecal injections of 1–3 mgr. of Old Tuberculin (T.A.) suspended in cerebro-spinal fluid by lumbar puncture.—C. Worster-Drought, M.P.C., June 14/22,514.

GENITO-URINARY TUBERCULOSIS: massive doses of P.T.O.; P.T. and Old T. to 1·5 Cc.—R. Creasy, L. i./20,542. *See also* B.M.J. i./27,491.

Unguentum Tuberculin (Old):—Lupus vulgaris has been diagnosed and treated by use of Old Tuberculin Ointment—5% of Old Tuberculin in a basis of Soft Paraffin. This is well rubbed in for one to two minutes and is also applied by means of a bandage to the affected area—the part being previously cleansed and crusts, if any, removed. On removal of the application varying degrees of hyperæmia and swelling are seen in the actual lupus tissue, with a moderate amount of hyperæmia with reddish papules extending one or two inches into the surrounding healthy skin (**Moro reaction** *q.v.*). After cleaning the surface, similar applications for treatment are made for the next three or four days, till the lesion closely resembles that produced by the application of a Salicylic Acid Plaster. This typical reaction only obtains in the actual disease and does not extend into the surrounding healthy skin. The pain produced may be considerable.

'T.O.A.,' *i.e.*, **Tuberculin-Original Alt**, is a germ-free Tubercle Bacilli bouillon culture (*typus humanus*), resulting from filtering mature cultures. The proper name under the *Therap. Subs. Regns.*, 1927 for this is **Tuberculin Bouillon Filtrate**, (*i.e.*, Tuberculin B.F., U.S.), with or without the suffix T.O.A. or P.T.O., *i.e.*, from human or bovine source. P.T.O.=Tuberculin B.F. Bovine U.S.

Dilutions greater than 1 in 10 do not keep well.

It has been used in the 'Dispensary Treatment,' *q.v.* Asthma and hay fever have been treated with it on empirical lines, *vide Therap. Index.*

Vacuum Tuberculin and **Vacuum Bovine Tuberculin** are also issued analogous to T.O.A. and P.T.O. concentrated to 1/10 volume—for treatment of special cases (not for diagnosis) where a mild effect is desired. *Initial dose* 0·1 Cc. of 1 in 100,000 dilution twice or thrice a week, at most doubling on second occasion. If reaction occurs 8-day interval after complete abatement of symptoms. Diluent Normal Saline with 0·5% Phenol.

Tuberculin A.F. (**Albumose-Free**). P.G. VI. *Dose* (Initial).—0·00001 Cc. in pyrexial cases; 0·0001 Cc. in apyrexial cases. Subsequent doses are determined from a study of the resulting reactions —constitutional, or general and focal. As a rule, reactions should be allowed to subside before a fresh injection is given.

A light amber coloured liquid, the product of the tubercle bacillus grown in a special culture medium free from albumoses and peptones, evaporated to $\frac{1}{10}$ its volume and finally filtered. It may contain 0·5% Phenol and is standardised at Frankfurt-a.-M.

This preparation, as already indicated, may well replace Old Tuberculin. It is used as *diagnostic* subcutaneously by conjunctival, intracutaneous and percutaneous application.

For treatment it is employed subcutaneously where a fold of skin and underlying tissues can be raised. Reactions obtained are thought to be specific, and anaphylactic symptoms are excluded in consequence of the absence of non-specific proteins.

'Tubercle Vaccines.'—The proper name under the *Therap. Subs. Regns.* 1927 for preparations made from the bacillary substance by growing the organism on artificial media. They are suspensions of the killed organisms or products derived from them :—

Tuberculin 'T.R.' (*of commerce*). **Human, Bovine and Mixed Types.**

Dose, initial (subcutaneous)—0·00001 to 0·0001 Cc. according as the case is pyrexial or not, rising gradually to 0·2 or even 1 Cc. Dilutions are made in 1 Cc., using 20% Glycerin as diluent.

N.B.—Doses should be stated in decimals and by no other method.

Although a stereotyped increase of dose is not advised the following scheme will be useful as a guide (reading downwards in each column) :—

0·00001 Cc.	0·0001 Cc.	0·001 Cc.	0·01 Cc.
0·00002 ,,	0·0002 ,,	0·002 ,,	0·02 ,,
0·00003 ,,	0·0003 ,,	0·003 ,,	0·03 ,,
0·00004 ,,	0·0004 ,,	0·004 ,,	0·04 ,,
0·00005 ,,	0·0005 ,,	0·005 ,,	0·05 ,,
0·00006 ,,	0·0006 ,,	0·006 ,,	0·06 ,,
0·00008 ,,	0·0008 ,,	0·008 ,,	0·08 ,,
			0·1 ,,
			0·2 ,,

As a rule weekly injections are given.

Several commercial preparations made on the lines of Koch's directions for T.R. are available.

'T.R.' of Koch contained ***2 mgr.*** of solid substance, ***not*** 10 mgr. as originally stated. An *enormous* amount of confusion was caused by this and indeed by the use of mgr. basis of dose at all. It may be recalled therefore that :—

0·00001 ($\frac{1}{100000}$) Cc. of 'T.R.' = 0·00002 ($\frac{1}{50000}$) mgr. (or 0·00000002 Gm.) of solid substance.

'Bold' Dose.—The large doses advised by Koch, starting from 0·0002 Cc. and repeated every second day with moderate increase of dose so that a rise of temperature greater than 0·9° F. was avoided—are not now generally administered.

The ***English School*** start with smaller initial dose (as already outlined) and do not look for any marked rises in temperature.

Tuberculin Bacillary Emulsion, 'B.E.' (*of commerce*) (Human Type, Bovine Type, or the two mixed are available).—*Dose.*—0·00001 to 0·00002 Cc. as a rule to begin with. For further details see below.

As proof of the immunising properties of his "T.R." and other preparations Koch demonstrated the production of specific immunising bodies which he called *Agglutinins*. The difference between 'B.E.' and 'T.R.' is that B.E. contains the *entire body substance of Tubercle Bacilli* whilst with T.R. the *soluble constituents* of the Bacillus are first rejected. The soluble Endotoxins are thought to play an important part in the production of Agglutinins and are contained in 'B.E.'

'B.E.' is, therefore, a suspension of entire pulverised Tubercle Bacilli in a mixture of equal parts Glycerin and Water. 1 Cc. contains 5 mgr. of thoroughly dried Tubercle Bacilli.

The dose is increased carefully at a rate which causes little or no rise in temperature (1° F.) and with intervals of about 1 week. With the small initial dose stated it is very exceptional for any reaction to appear. Should a rise occur, the dose should not be exceeded and temperature must have reached its previous level.

Table for conversion of Doses of 'B.E.' Human or Bovine or mixed Human and Bovine, into 'Bacillary Substance.'

0·00001	(1/100,000)	Cc. =	0·00005	(1/20,000)	Mgr.	Bacillary Substance
0·00002	(1/50,000)	Cc. =	0·0001	(1/10,000)	Mgr.	,,
0·00003	(3/100,000)	Cc. =	0·00015	(3/20,000)	Mgr.	,,
0·00004	(1/25,000)	Cc. =	0·0002	(1/5,000)	Mgr.	,,
0·00005	(1/20,000)	Cc. =	0·00025	(1/4,000)	Mgr.	,,
0·00006	(3/50,000)	Cc. =	0·0003	(3/10,000)	Mgr.	,,
0·00001	(1/12,500)	Cc. =	0·0004	(1/2,500)	Mgr.	,,
0·0001	(1/10,000)	Cc. =	0·0005	(1/2,000)	Mgr.	,,
0·0002	(1/5,000)	Cc. =	0·001	(1/1,000)	Mgr.	,,
0·0003	(3/10,000)	Cc. =	0·0015	(3/2,000)	Mgr.	,,
0·0004	(1/2,500)	Cc. =	0·002	(1/500)	Mgr.	,,
0·0005	(1/2,000)	Cc. =	0·0025	(1/400)	Mgr.	,,
0·0006	(3/5,000)	Cc. =	0·003	(3/1,000)	Mgr.	,,
0·0008	(1/1,250)	Cc =	0·004	(1/250)	Mgr.	,,
0·001	(1/1,000)	Cc. =	0·005	(1/200)	Mgr.	,,
0·002	(1/500)	Cc. =	0·01	(1/100)	Mgr.	,,
0·003	(3/1,000)	Cc. =	0·015	(3/200)	Mgr.	,,
0·004	(1/250)	Cc. =	0·02	(1/50)	Mgr.	,,
0·006	(3/500)	Cc. =	0·03	(3/100)	Mgr.	,,
0·008	(1/125)	Cc. =	0·04	(1/25)	Mgr.	,,
0.01	(1/100)	Cc. =	0·05	(1/20)	Mgr.	,,
0·02	(1/50)	Cc. =	0·1	(1/10)	Mgr.	,,
0·04	(1/25)	Cc. =	0·2	(1/5)	Mgr.	,,

To convert the above 'Bacillary Substance' stated in decimal part of a milligramme into decimal part of a Gm., carry the decimal point three places to the left. Thus 0·00005 Mgr.=0·00000005 Gm.

Dilutions are best made with 0·8% Sodium Chloride and 0·5% Phenol. A 1% Dilution of the original is sometimes called "Dilution No. 1," a 0·1% is No. 2 and so on. Not used as a diagnostic.

Bold Dosage (*cf.*,p. 929), was advocated by the German school. Starting with the same initial dose (0·00001 to 0·00002 Cc.), at one or two days' interval, the dose was rapidly increased from twice to five times the dose at each injection, until definite reaction appears with a rise of $2\frac{1}{2}$ to 5° F. in temperature. As soon as such violent reaction develops much longer pauses, 6—8 days, were made. The injections were increased to 4 Cc. undiluted B.E. Koch regarded the immunisation as complete only when the patient could tolerate this without reaction. The larger doses of 2 to 4 Cc. were only injected at intervals of 2 to 4 weeks.

In exceptional cases ***(English dosage)*** the initial dose may be as minute as 1/1,000,000 mgr. Bacillary Substance with gradual rise —the limit being—1/500 mgr. Bacillary Substance (=0·0004 Cc.), *Average doses* are respectively 1/20,000 mgr. (=0·00001 Cc.). 1/5,000 mgr. and 1/2,000 mgr. diluted in 1 Cc.

Sir A. E. Wright recommends doses of 1/4000 mgr., and rarely goes beyond 1/1000 mgr. in treatment.—Stitt.

Tuberculosis treated by Insufflation of bacillary emulsion of dead tubercle bacilli, 1/5000 to 140 mgm. 3 times a week—results encouraging.—O. F. Paget, per Clin. Jl., April 18/23,192.

Tuberculosis Immunising Vaccine (Nathan Raw). *Syn.* **Tubercle Vaccine R.'** N. Raw states that virulent tubercle bacilli—after years of subculturing—can be attenuated. The present cultures (subcultured monthly) represent the 216th generation—still true to type, but even when injected in large quantities into animals they are non-tuberculogenic and avirulent.—B.M.J i./25, 741. In his opinion this remedy should be of greatest value, not only in curing the disease, but also in its prevention, by protecting the human body against attack. Cattle can be rendered immune to virulent bovine bacilli by previous inoculation with virulent human bacilli. There is a marked antagonism in the human body between human and bovine infections. These two organisms cannot flourish in the body at the same time.

Extended clinical investigation at Liverpool showed that the human body is attacked by two quite distinct forms of tubercle —the one conveyed by direct infection and attacking chiefly the lungs (so-called consumption) ; the other, the surgical form, conveyed by milk from tuberculous cows and developed in the first few years of life. A vaccine made from bovine cultures should be used in the treatment of human infections and *vice versa*.

Raw's Vaccine is a bacillary emulsion of the bacilli containing all the products of the bacillus. It is non-toxic and avirulent, and produces no reaction even in large dose.

Dose.—0·001, 0·002, 0·003, 0·004, 0·005 and 0·006 mgr. for immunising susceptible children at weekly intervals, repeated in three months.

For *treatment* of the active disease, commence with 0·001 and increase to a maximum of 0·025 mgr. Twelve injections should be

given at intervals of seven days. Vaccine should be freshly made. Results in suitable cases excellent.—N. Raw, B.M.J. i./21,595, L. i./21,693. *See also* B.M.J. i./25,741 and L. i./21,1305.

Results of treating 88 cases of tuberculosis with N. Raw's Vaccine during 12 months.—N. Raw, Pr., Apl. 22/229.

Tuberculosis Immunity. As a result of the treatment of over 3,000 cases of tuberculosis with every preparation of Tuberculin, the author is convinced that a vaccine prepared from an attenuated and non-pathogenic culture, free from all toxins, gives far the best results.—Nathan Raw, Pr., Nov. 23, 317.

Dreyer's Tuberculosis Vaccine. Some years ago Professor Dreyer introduced a 'Defatted or 'Diaplyte' Vaccine. This was given a thorough trial under the auspices of the Medical Research Council but the hopes entertained for it were not realised.—L. S. T. Burrell, 'Recent Advances in Pulmonary Tuberculosis' (Churchill, 1931).

General References to Use of Tuberculins.

For earlier References, see previous Edns.

For and Against Tuberculin.

H. Batty Shaw says: If Tubercle Bacilli gain access to the body they surround themselves with an almost impenetrable ring of fibrous tissue, caseous or calcified material, then any subsequent development at a remote part, *e.g.*, of the skin or subdermic tissues, of 'sessile' tuberculin or tuberculo-amboceptors by means of injections of Tuberculin or Tubercle Bacilli, may be quite unable to reach the Tubercle Bacilli.—B.M.J. i./13,921.

The ideal Tuberculin has not yet been found and the method of its action on healthy and unhealthy cells respectively has not been satisfactorily worked out. *In spite of all research the treatment of any individual case must be more or less of a leap in the dark.*—Editorial, B.M.J. ii./13,1243.

Tuberculin in certain cases acts 'like a charm,' in others it does little or no good, and in others again does actual harm. Except in cases of asthma, much improvement with Tuberculin cannot be expected in 'subsensitive' cases (*e.g.* those which react to a 1 in 10 dilution of Old Tuberculin).—F. E. Gunter, B.M.J. i./24,1049.

Experimental Tuberculin treatment with guinea-pigs ineffective and harmful.—L. S. P. Davidson, L. i./25,13.

Tuberculosis in the Tropics. No good result seen following Tuberculin, and in many cases chance of recovery destroyed.—Sir James Fowler, L. i./25,1236.

Evidence to show that Tuberculin is specific both in diagnosis and in treatment.—F. G. Griffiths, B.M.J. i./27,827, *ibid.* 897.

Combined type of tuberculins plus B. Coli found capable, especially in tubercular disease of the bones, but certainly, if judiciously given, in any tubercular disease—of giving extraordinary sense of well-being and comfort with, as a rule, improvement in appetite.—R. Robertson, Pres., Feb., '20.

Tuberculin treatment. Focal reaction important. Dose should be regulated so that 'lumps' at the seat of injection do not form. One must find the tuberculous content of the patient before the disease can be attacked successfully.—R. Robertson, Pr., May, 22/354.

Tuberculin "offers a certain cure in 90% of early cases." Four essential points: (i.) Not to be given when patient has intermittent or continuous pyrexia. (ii.) Dose to be given twice a week. (iii.) Persistence until large doses are reached. (iv.) Temperature taken four times a day. Recommends beginning with P.T.O. 0·0005 Cc. gradually increased to 1 Cc., then P.T. 0·005 Cc. increased to 1 Cc., then Old T. 0·05 Cc. increased to 1 Cc. After a reaction *i.e.*, either general (rise in temperature, nausea and perhaps vomiting) local or focal at site of tubercular disease, no further doses should be given for one week. Then, unless the reaction is unusually severe, the same dose should be given. In a few very sensitive cases it may be necessary to begin with as little as 0·0000002 Cc. T.A.F. Minimum time for first course, five months.—Rolf Creasy, Jun., M.P.C., Jany. 24,23,66.

The improvement occasionally following the Tuberculin reaction may be seen after the shock following other substances, *e.g.* Normal Horse Serum. Apart from this action Tuberculin has *no therapeutic value whatever.* An overdose may do considerable harm, but it is safe in experienced hands and its

dangers have been much exaggerated.—L. S. T. Burrell, 'Recent Advances in Pulmonary Tuberculosis' (Churchill, 1931).

Of 267 tuberculosis specialists replying to a questionnaire only 5 used Tuberculin as the main form of treatment. The majority counselled ***against its use*** in all but quiescent or slightly active cases, and 63 reported harmful results.—L. Hektoen and E. E. Irons, Jl. A.M.A. i./29,869.

TUBERCULOUS ASTHMA can be ameliorated or cured by the following technique. Commence with 0·1 Cc. **Tuberculin liniment** and double weekly till 1 Cc. is given. A Tuberculin rash often appears in due course at the site of application, usually accompanied by amelioration of the asthma. If not, proceed to injections, commencing with T.A.F. 0·0001 Cc. and increasing weekly. If reaction or an attack of asthma ensues return to the liniment. —F. E. Gunter, B.M.J. i./29,575.

TUBERCULIN DISPENSARY TREATMENT.—W. Camac Wilkinson read a paper at the B.M.A. Meeting 1910. He reviewed the contraindications usually accepted and pointed out that Tuberculin acted like magic in cases of hæmorrhage, apart from complications. Tuberculin never failed when Sanatorium methods succeeded. In the first stage pulmonary tuberculosis could be cured with certainty by Tuberculin, in the second permanent results are obtained in 40 to 60% of cases. A further paper dealing with laryngeal tuberculosis; some remarkable results are described. Only early or suspected cases are suitable for this form of—Dispensary—treatment. The treatment should be refused to all presenting evidence of mixed infection.—(Leader) B.M.J. i./11,265.

From a study of his papers his usual treatment is *first a course of 'P.T.O.,' then 'P.T.' (may be repeated courses), then Tuberculin Old—or more recently Tuberculin 'A.F.'*

"The dosage (at the Portsmouth Municipal Tuberculin Dispensary) is approximately as follows:—First dose of 'P.T.O.' is from 0·00025 *to* 0·005 *Cc.—increased gradually to* 0·5 *or* 1 *Cc. When this has been reached without reaction (over* 100° *F.) P.T. (which is said to be* 40 *to* 50 *times as powerful as P.T.O.) is given, i.e., after* 0·5 *Cc. of 'P.T.O.' the usual dose of 'P.T.' will be* 0·01 *Cc. until* 0·5 *to* 1 *Cc. is taken without reaction, when a short course of Old Tuberculin with a maximum of* 0·5 *to* 1 *Cc. is injected."*

In support of large doses of Tuberculin subcutaneously.—W. Camac Wilkinson, B.M.J. i./23,675.

Regarding **Municipal Tuberculin Dispensary Treatment,** we provided a number of abstracts of the literature in our 17th Edn., p. 895.

Pulmonary tuberculosis treated with Tuberculin. Method of Camac Wilkinson used as above outlined. In all about 40 injections were given, lasting over a period of six months; good results obtained.—W. Stobie, B.M.J. ii./22,473.

In a criticism of C. Wilkinson's book, 'The Principles of Immunity in Tuberculosis,' it is asked, 'If tuberculin is of such high value, why, after so many years, is it so little used; or, rather, why is it feared and condemned?" —B.M.J. i./26,1039.

Prophylactic vaccination of the newly-born against tuberculosis.

'B.C.G.' (Bacille Calmette-Guérin), a strain of tubercle bacillus grown on glycerinated Ox Bile, first described by Calmette in 1909, was subcultured 230 times up to January, 1921, when vaccination experiments were started, and was then incapable of producing tubercles. Caused a general disease in calves resembling typhoid fever, clearing spontaneously after 15—20 days without producing slightest tubercle formation. 'B.C.G.' now cultivated on potato and glycerinated veal broth or Sauton's Asparagin medium; cultures must not be more than 10 days old. Administered in milk at body temperature in three doses and harmless even in new-born infants. Up to end of 1925, 1317 new-born infants treated (of which 586 had been in contact with tuberculous cases). Of this number, 10

died of tuberculosis by end of first six months. Final judgment cannot yet be given.—L. ii./26,1046.

None of the children vaccinated in 1922 (and left exposed to contamination) with Calmette's B.C.G. bacillus vaccine have died, and only 0·5% of those vaccinated in 1924 have died from presumed tuberculosis. It has proved entirely harmless for all infants vaccinated more than three years ago.—Presse Medicale, per Jl. A.M.A. ii./25,474.

Of 882 cases reported on from one to two years after vaccination there were 7 deaths from tuberculosis and 72 from other diseases, and of 87 reported on more than two years after vaccination there were no deaths from tuberculosis. The conclusion is that mortality from tuberculosis among vaccinated cases is 0·8 per 100 living and from all cases 8·9 per 100 as compared with 26 per 100 in the same age group of children born of tuberculous parents or living in tuberculous environment.—L. i./27,936.

Vaccination against tuberculosis (Calmette Vaccine).—B.M.J. i./26,581. *See also* L. i./25,1353.

Statistics show a striking difference in the tuberculosis mortality in France existing between infants who have been vaccinated by the method of Prof. Calmette and those not so vaccinated. The procedure is to give 3 doses, each of 10 mgr. of a non-virulent strain of tubercle bacilli during the first 10 days of life, and the figures represent the mortality calculated on each of the first two years of life.—Leader, B.M.J. i./27,845. *See also ibid.* 897, 1082, in which limitations in the value of the statistics are expressed by M. Greenwood.

Destructive criticism of 'B.C.G.' Figures unsatisfactory. Calmette's claims 'optimistic.'—B.M.J. i./28,364.

Prophylactic inoculation of adults with B.C.G.—L. ii./28,931.

Over 300,000 doses issued by the Pasteur Institute during the past 7 years without a single accident. The oral route only should be used by the general practitioner.—per Pres., July '29,253.

3 doses given *per os* according to Calmette's prescription during the first 10 days of life, repeated at 1 year, and again at 3 years. After the first 10 days it may be given subcutaneously, if 2 negative cuti-reactions obtain at 8-day intervals—*dose* 0·01 mg. to 0·5 mg.—per Pres., July '29,254.

May be a dangerous procedure owing to possible transmutation of the micro-organism into a virulent form by cultivation on a medium containing its anti-serum.—Petroff (U.S.A.), per Pres., July '29,254.

The Ukrainian Commission reports that it is harmless.—per Pres., July '29,255.

Vaccination with B.C.G. on a large scale might usher in a new era in the campaign against tuberculosis. Norwegian proposals.—J. Heimbeck, L. ii./29,887.

Conservative attitude apparently justified.—L. ii./28,473 ; B.M.J. ii./30,695.

To attempt to protect persons by Tuberculin or tubercle bacilli appears to be ***wrong procedure.***—L. S. T. Burrell (Mitchell Lecture), B.M.J. ii./30,878.

Popular education regarding cause and natural history of tuberculosis is improving matters. B.C.G. a remarkable experiment on so large a scale.—Sir R. Philip, B.M.J. i./31,43. Discussion.—R. Carswell, *ibid.* 155, D. J. Gair Johnston 155, and J. Gibbens, 156.

Prof. Calmette's statements on B.C.G. to Roy. Soc. Med. The untreated child is auto-vaccinated by milk, food, dust, etc. In Calmette's method an attenuated strain (230 passages) of living organisms is employed. Mention of first child treated (born of tuberculous mother and grandmother) : 10 years after the child is healthy and well.—B.M.J. i./31,1070,1080.

B.C.G. tried on calves. Interim Report, Cambridge University. Raises resistance to a virulent experimental infection. Intravenous injection best.—Prof. J. B. Buxton, L. i./31,393.

Cattle immunisation against tuberculosis. A survey of work. The resistance of the calf can be raised, but not invariably.—L. i./31,826.

Still regarded by the National Association for Prevention of Tuberculosis as being in the experimental stage.—L. ii./31,260.

The Lubeck Disaster.

B.C.G. caused tragedy at Lubeck. 50 out of 246 infants developed symptoms of acute tuberculosis, with 14 deaths.—L. i./30,1137.

Prof. Deycke and Dr. Altstädt were both found guilty of manslaughter by negligence in 68 cases and of injury by negligence in 131 cases and were

sentenced, on Feb. 6, 1932, to 2 years and 1½ years imprisonment respectively. The presiding judge said that although according to some experts B.C.G. Vaccine under certain conditions may become virulent the disaster had actually been caused by an exchange of B.C.G. with other virulent bacilli or by contamination. The negligence in the case of Prof. Deycke was that he had prepared the vaccine in a laboratory where such contamination or exchange was possible, and in the case of Dr. Altstädt (Director of the Lubeck Health Dept.) in not testing the cultures before distribution and in not immediately stopping distribution as soon as he was informed that there was something wrong with them.—L. i./32,365.

The following additional (unclassified) preparations are used in treatment :—

Beraneck's Tuberculin consists of a mixture of tubercle-broth filtered free from bacilli and concentrated *in vacuo*, with an extract of the bacilli made with phosphoric acid. It is stated to contain exotoxins and endotoxins and acts like a vaccine, strengthening the bacteriolytic power of the protective cells ; it also exercises a bactericidal or attenuating effect on the Tubercle Bacillus.

It is supplied in 6 dilutions, $T.Bk_1$ to $T.Bk_6$, *viz.*, 1 : 10 to 1 : 1,000,000 for use.

Spahlinger's Tuberculosis Vaccine.

Method of preparation of the vaccines disclosed by M. Henri Spahlinger as a result of financial assistance on the part of a small group of people (H.H. The Aga Khan, Lord Crewe, Lord Roseberry, Lady Seaforth, and Sir Arthur Stanley). Methods of preparation of a bovine vaccine for cattle immunisation and of a harmless vaccine for human prophylaxis. The original cost of £2 a dose now reduced to about 2/–. Tubercle bacilli for making the vaccine are grown under environments of food, heat, etc., natural to the disease. They are emulsified with normal saline in the absence of oxygen, then placed in ampoules and kept in the cold and dark for a year or longer and allowed to die a natural death. They thus retain unimpaired the chemical and physical structure by reason of which they are effective vaccinating agents. This replaces customary animal passage from human beings and subsequent culture on artificial media, different from the original environment which, it is claimed, alters the character of the organism. It is held that a vaccine made on the latter lines cannot deal with the disease in an animal of the group from which it was originally taken.—B.M.J. i./32,252.

For a number of statements relative to *Spahlinger's Serum*, 1922–1927, *see* Edn. XIX., p. 946.

A new Tuberculin. Cultivation on blood serum unsterilised by heat so as to stimulate conditions in the human body, and the inclusion of part of the filtrate in successive cultures.—H. Hyslop Thomson, B.M.J. ii./26,587.

TUBERCULIN REACTIONS FOR DIAGNOSIS.

Subcutaneous test.

The test in the human being (*not usually considered safe*).

An initial dose of 0·2 Cc. of a 1 in a 1000 dilution of old tuberculin is injected subcutaneously. If no rise of temperature follows, give 1 Cc. of a 1 in a 1000 dilution at least 48 hours later. If again no rise of temperature occurs give 0·5 Cc. of a 1 in a 100 dilution. Finally, if necessary, 1 Cc. of a 1 in a 100 dilution. A rise of 2·3° F. or more occurs in tuberculous subjects, some 6 or more hours after the injection of tuberculin.

The test for veterinary use.

The animal is confined to its stall for 24 hours before the injection is made and its temperature observed. 3 to 4 Cc. of a 1 in 10 dilution are injected subcutaneously in the neck. The temperature is taken 6, 9, 12, 15, 18, 24 and 36 hours after inoculation. If there

is a rise of temperature of 1·4° C. or more the animal should be regarded as tuberculous. With a rise of temperature from 0·8—1·4° C. the diagnosis is doubtful and the test should be repeated after one month.

N.B.—This test has been proved to be of the utmost value for the diagnosis of tubercular infection in cattle. Occasionally in animals with advanced infection the test is negative. In these cases, however, the diagnosis can usually be arrived at by other means. In a few cases, in animals suffering from echinococcus infection a slight positive reaction has been obtained.

After a dose of Tuberculin in cattle, a further dose during six months may fail to again produce a rise in temperature.

Tuberculin Tests of Cows. Unless test be carried out with most scrupulous care doubtful results are numerous.—Capt. S. R. Douglas, L. ii./22,929.

As diagnostic, stated to be reliable. Tubercle can be stamped out from our herds.—Prof. S. H. Gaiger, B.M.J. ii./22,961. Further refs. Edn. XVIII.

Tuberculin Committee's Report.

Tuberculin Tests in cattle. Subcutaneous test unsatisfactory under farm conditions, and ophthalmic test only be regarded as subsidiary. Complete confidence in intradermal test.—B.M.J. i./25,797.

Cutaneous test (von Pirquet). Cleanse the inner side of the forearm with ether and alcohol. Make two similar scratches with a sterile needle 3 inches apart (avoid drawing blood). On one scratch, place a drop of 1 in 4 old tuberculin in sterile water (pure old tuberculin is sometimes used), keep the other scratch as a control. Examine at 12, 24 and 36 hours. A positive reaction occurs in from 3–24 hours and is usually at its height at 36–48 hours. The skin becomes red and slightly raised on each side of the scratch over an area 10 mm. broad, reactions under 5 mm. should be regarded as doubtful.

Constitutional reactions following cutaneous Tuberculin Tests.—Am. Rev Tub., Sept. '25, per Jl. A.M.A. ii./25,1583.

A delicate indicator of tuberculous infection in childhood.—It does not fail even in massive tuberculous disease.—C. McNeil, B.M.J. i./23,673.

Intradermic test (Mantoux). Intradermic injections of 0·1 Cc. are made into the cleansed forearm of :—

1. Normal saline (the same as is used for diluting the tuberculin).
2. 1 in 10,000,000 Old Tuberculin in normal saline.
3. 1 in 1,000,000 ,, ,, ,,
4. 1 in 100,000 ,, ,, ,,
5. 1 in 10,000 ,, ,, ,,

A positive reaction appears in 6–8 hours, maximum 24–48 hours, subsides 6–10 days.

The skin at the site of inoculation becomes infiltrated and hyperæmic in severe reactions vesiculation occurs. (Routine tests may be made with No. 1 and 4 only.)

The usual technique is to inject 0·1 Cc. of 1/1000 Old Tuberculin intradermally. Extremely valuable in children. Negative result excludes tuberculosis, strongly positive suggests active tuberculous disease with bad prognosis, and mild positive suggests tuberculous infection amenable to open-air treatment.—W. F. Gaisford, L. i./31,521.

100-fold or less dilutions used in a volume of 0·1 Cc.—L. i./31,873.

Mantoux Test more delicate than von Pirquet's Test. The latter is equivalent to 0·1 Cc. of 1 in 10,000 Tuberculin given intracutaneously.—D. J. Dow and W. E. Lloyd, B.M.J. ii./31,186.

So far as adults in this country are concerned a positive Tuberculin reaction has no diagnostic significance whatever.—S. L. Cummins, B.M.J. i./29,336,522. Criticism by W. C. Wilkinson, *ibid.* 621.

Percutaneous test (Moro). An ointment made of lanolin and old tuberculin in equal parts is rubbed on to the skin of the chest. A positive reaction is shown by the development of reddening and papules.

Tuberculin Ointment (for percutaneous use—Philip). Tuberculin Original Koch 10 to 50, Eucalyptol 5, Eucerin to 100 ; Beraneck's Tuberculin is also suggested.

Percutaneous exhibition of Tuberculin exerts a remarkable influence on the first buddings of tuberculosis in childhood. Continued observations, over long periods, show it is capable of effecting the nearest approach to *de*tuberculisation yet realised. Used as diagnostic and therapeutic agent, the two-fold aspect must be kept steadily in view. The local stimulation by Tuberculin at each tuberculous focus is an important step. When Tuberculin is rubbed firmly into the skin of a tuberculous patient it is freely absorbed and exerts a specific curative influence. Generally, a 25% preparation is convenient. In young subjects, or where there is doubt as to the number and extent of foci involved, begin with 10%. The actual amount of Tuberculin used in a straightforward case (using, say, 25% dilution), may be approximately 0·1 Cc. The ointment containing this quantity is rubbed (worked) into the cleansed skin, over an area of 1 or 2 square inches, by means of a small glass rod. Repeat once weekly.—Sir Robert Philip, B.M.J. i./23,493.

Tuberculin Old or P.T.O., or equal parts of both, mixed with Compound Camphor Liniment in proportion of 1 to 5 minims to 1 drachm, used for local application, *e.g.* in abdominal disease or pulmonary tuberculosis. An ointment using Anhydrous Lanolin employed for lupus or adenitis.—J. Crocket, B.M.J. i./22,679.

Patients treated by 0·01 Cc. T.A.F. diluted with a suitable quantity (*e.g.* 0·5 Cc.) of Compound Camphor Liniment rubbed into back of upper arm. If no reaction the dose is doubled at next sitting and doubling continued until 0·1 Cc. tuberculin is reached, after this the dose is increased with caution to 1 Cc. of tuberculin. Interesting to note that all cases of asthma reacted to 1 in 10 or 100, not one to 1 in 500. Tuberculin used as test to sensitiveness by von Pirquet's reaction, as modified by Ellis, initially.—F. E. Gunter, B.M.J. i./26,1083.

For the Serum Diagnosis of Tuberculosis, see Vol. II.

Typhoid Fever, Anti-Typhoid Inoculation.

In the war each nation initially employed for immunising purposes preparations of the *B. Typhosus* alone without realising the importance of the Paratyphoid organisms.

The vaccine had to be amended to include the latter when the overwhelming preponderance of Paratyphoid infection was realised. Sir W. H. Willcox (L. i./16,454) for example in detailing his experience in the Dardenelles Area of a large number of cases, states that while Typhoid cases were 13·5%, Paratyphoid constituted 86·5%. The Paratyphoid on subdivision gave 'A' 47·5% of total, 'B' 29% and non-agglutinable Paratyphoid 10%. In fact the Paratyphoid cases were in his judgment considerably more than 6·4 times as numerous as the cases of typhoid. In normal times in the past paratyphoid has been a relatively uncommon disease. The virulence of the paratyphoid organisms is much lower than that of *B. Typhosus* or thousands of lives would have been thrown away.

The immunity created by prophylactic inoculation with **'T.A.B.' Vaccine** remains at a high level for at least six months—probably for twelve, and should an inoculated person contract the disease, its severity is diminished and the percentage mortality lowered.

A single positive Widal Test is of no value, but a study of the agglutination curve for the several organisms was proved to be essential for correct diagnosis in cases which had been inoculated with '*T.A.B.*'

An outbreak of Paratyphoid 'B' conveyed by ice-cream. 63 cases at Norwich, June, 1926.—V. F. Soothill and G. L. Leggat, L. i./27,1233.

The ***case incidence for 1926*** was 2,739, as compared

with 2,779 in 1925. 4,121 in 1924, and 3,211 in 1923.—Sir George Newman's Report for 1926, B.M.J. ii./27,458.

Anti-Typhoid-Paratyphoid Vaccine (T.A.B.) (*Therap. Subs. Regns.* 1927 *name*) is made from cultures of Typhoid and Paratyphoid 'A' and 'B' organisms, ampoules containing 500, 1000 and 2000 millions of each organism.

For immunising.—These doses are given in series at intervals of not less than 7 days; the interval of 10 days is to be preferred. An interval of 14 days is even better. (*Some give only the* 500 *and* 1000 *millions at* 10 *days in urgency.*) The dose is given *subcutaneously* into the tissues of the upper arm just below the insertion of the deltoid.

For children the dose may be on the lines of Gaubius' Dose Table. Thus a child of 7 would receive 1/3 average dose.

According to a report to the Medical Research Committee by G. Dreyer, A. Duncan Gardner, A. G. Gibson and E. W. Ainley Walker —(see L. i./18,498)—on Prophylactic Typhoid plus Paratyphoid inoculation (T.A.B. vaccine) 1000 million Typhoid and 750 million each 'A' and 'B' per Cc. should be given in doses of 0·5 and 1 Cc. as first and second dose to ensure protection. The interval between the first and second should be lengthened from 10 days to 18 or 20 days.

Technique.—Rub the area with antiseptic solution. A good fold of skin and underlying subcutaneous tissues is lifted firmly between the left thumb and forefinger and the needle plunged boldly and quickly to the depth of *about an inch*, the tissues released and the injection given slowly into the tissues. The puncture may be touched with weak antiseptic or dried and a little collodion applied.

The patient should take no alcohol whatever during the 24 hours preceding and after the injection.

Contraindications.—Alcoholics react more strongly than others. Kidney disease requires caution and there is possibly slight risk in the case of old standing tuberculosis.

Effects.—Tenderness at the place of inoculation is at its worst in about 18 hours. Redness may be caused. Give free use to the arm the day after injection. Malaise begins in about 6 hours. Occasionally a rigor. There is usually headache and a slight degree of pyrexia Occasionally temperature up to 101° F., rarely 103° F.

F.E. VIII. specifies T.A.B. Vaccine containing 1000 mill. T. with 750 mill. each A and B per Cc.

Anti-Typhoid Vaccine (plain) is also made. *Dose* 1000 million and 10 days later 2000 million.

F.E. VIII. has these two strengths.

Anti-Typhoid-Paratyphoid-Cholera Vaccine (T.A.B.C.) (*Therap. Subs. Regns.* 1927 *name*). *Syn.* CASTELLANI'S TETRA VACCINE.

No. 1.—One Cc. contains 500 million B. typhosus, 375 millions each B. paratyphosus 'A' and 'B', also 5000 million Cholera Vibrio.

No. 2.—Contains double quantities of No. 1 per Cc.

Dose.—1 Cc. of No. 1, followed by 1 Cc. of No. 2, after customary interval.

Dysentery Vaccination (almost simultaneously) has been conducted with the above.

Plain Anti-typhoid Vaccine and 'T.A.B.' are also used ***for treatment.***

Dose.—50, 100, 250, 500, 1000 and 2000 millions. An initial dose of not less than 250 millions can be safely used—these to be repeated or increased under guidance of the clinical signs and symptoms, It might be of value to give a vaccine of *B. Coli* and *Streptococci* to raise the immunity against these organisms before they can take an active part in the process of destruction of the tissues (as in the later stages of typhoid).

T.A.B. Vaccine of undoubted value in treatment of enterica; curtails pyrexia, limits toxæmia, and prevents complications.—M. L. Treston, I.M.G. Oct. '26,479.

Small doses of Anti-Typhoid Vaccine should be used at first, viz. 50 million, and gradually increased. Dose reduced with pulmonary complications, and treatment suspended on occurrence of intestinal hæmorrhage, also in hyperpyrexia, syncopal attacks, and much enlargement of spleen. Cardiac complications not contraindicated except during early stage.—B.M.J.E. i./26,43.

Intravenously Anti-Typhoid Vaccine found of value in the treatment of typhoid fever. Large initial doses must be avoided. A febrile reaction exceeding 40·5° C. is inadvisable. The initial dose should be about 120 mill. B. typhosus, gradually increased to 200 mill. if necessary. Perforation, severe hæmorrhage, severe myocardial degeneration and severe second infection are contraindications. Mild hæmorrhage, pneumonia, mild myocardial degeneration, meningeal symptoms and severe toxæmia are indications for use of smaller doses than usual.—K. D. Fairley, per Jl. Trop. Med., Dec. 15/23,368.

Efficacy of Vaccine treatment still unsettled after 30 years. Barely 4000 cases have been treated. Intramuscular injection of no value :—intravenous injection of a formalised vaccine of several strains shortened duration of the disease.—B.M.J.E. i./28,112.

Internal Administration.

In an outbreak of typhoid in the Pas-de-Calais, vaccine was given to some 1,200 individuals in pill form. The results compared with a control group, in which ordinary prophylactic inoculation was carried out subcutaneously, showed encouraging results, pointing to an increased efficiency of Besredka's oral method. (Besredka claims that rabbits could be immunised against typhoid, paratyphoid, etc., by feeding with cultures of the organisms, after a preliminary treatment with bile).—J. Pratt Johnson, L. ii./22,753.

Anti-typhoid vaccine administered *per os* gave excellent results in an outbreak among natives employed in a gold mine near Germiston (S.A.). Doses consisted of 40,000 mill. (B. typhosus) given for 2 or 3 successive days.—A. J. Orenstein and J. H. Pirie, per Jl. Trop. Med., Sept. 15/23,292.

Prophylactic typhoid vaccination of 850 subjects by the mouth. Nine developed typhoid fever from one to twelve months after vaccination. No be-effects.—per Jl. A.M.A. ii./25,1678.

A variation of Besredka's typhoid immunisation by oral administration of a vaccine is used by the S. African Institute for Medical Research, and thousands of natives have been vaccinated by this method, which consists in giving *per os* a liquid suspension of killed *B. typhosus* and *B. paratyphosus* 'A' and 'B,' and simultaneously ***a pill of Ox Bile.*** No unpleasant reaction or malaise is stated to follow and immunisation is supposed to be as efficacious as by the hypodermic method.—B.M.J. ii./27,1050.

Good results from prophylactic inoculations obtained in American and Japanese Armies.—Bunshiro Tanabe, per Jl. Trop. Med., April 2/23,115.

Vaccine therapy *per os* effective for typhoid. Of 4410 men treated with oral antivirus, preceded by bile, not one developed typhoid in the Rhine Army, while of 549 treated without bile 0·07% were affected. The method prevents the gradual encroachment of B. typhosus on cells still healthy and cuts short the period of illness.—Prof. Besredka, L. i./29,1092.

Oral immunisation against typhoid in S. Africa at least equal to subcutaneous injection—quicker effect.—E. Cluver, L. i./29,1302.

The annual typhoid incidence rate for American troops during the World War was 0·37 per 1000, or a total of 1529 cases in an army of 1,500,000, as

compared with 141·59 per 1000 in the Spanish-American War, or 20,926 in 148,000. During the World War every American soldier was given 3 doses of Anti-typhoid vaccine or one of Lipovaccine before reaching France.—Jl. A.M.A. ii./28,32.

Disseminated Sclerosis well treated by weekly ***intravenous injections*** of anti-typhoid vaccine — dose injected sufficient to induce febrile reaction. The ***Doses usually given.*** are 10, 25, 35, 50, 70, 100, 125, 150, 175, 200, 225 and 250 million.—W. H. M. Reaction makes patient ill for a couple of days. Encouraging results—30·6% showed marked improvement. Of 29 cases of the slow, steadily progressive type, 8 were greatly benefited. Improvement maintained up to 2 years.—Sir J. Purves-Stewart, Med. Ann., 1925,393.

Better results with a treatment of Anti-Typhoid Vaccine, Neo-Salvarsan and Calcium Chloride. The Neo-Salvarsan is dissolved in Calcium Chloride solution (10 Cc. of a 10% solution), and the vaccine also mixed with Calcium Chloride. Initial dose of vaccine 25 mill. progressively increased. 11 injections of Calcium Chloride and vaccine, alternating with 11 of Neo-Salvarsan in Calcium Chloride, *i.e.*, 22 injections in all, spread over 11 weeks. 1st dose Neo-Salvarsan 15 cgr., 2nd 30 cgr., and remaining 9 each 45 cgr., making a total of 4·5 Gm. Feeling of intense glowing heat immediately after Calcium Chloride injection and nauseous taste after Calcium-Neo-Salvarsan. Of 64 patients so treated 40 were much improved, 6 of whom became symptom-free : 16 were improved, and 8 showed no improvement. Older patients and longer duration of diseaseless favourable results. Recent cases with symptoms mainly of cerebellar type specially favourable.—Sir J. Purves-Stewart, Med. Ann. 1926,420.

Rheumatoid Arthritis treated by ' (T.A.B.)' Vaccine, *see* p. 668 and Therapeutic Index.

Earlier References to Typhoid.

TYPHOID CARRIERS, *vide* VOL. II.

Living Attenuated Vaccine containing living typhoid organisms (attenuated by heat at 50° C.) gives a higher degree of immunity than the use of dead organisms (given subcutaneously). The strain of organisms should be non-virulent but rich in antigen as determined by animal experiments. The immunisation is only partial.—A. Castellani, L. i./13,595.

Interspacing of doses.—Some cases did well on daily doses. Medium dosage, say 100 millions may be given to begin with gradually increased to 200 or 300 millions with interval of 24 to 48 hours between each dose.

The Vaccine treatment seems to make average cases mild, severe cases into average and only the very worst cases are not favourably affected. Clinical improvement five days after a dose of 2 millions.—F. J. Sadler, Q. Jl. Med., Jan., 1912. Much smaller doses were used than those now suggested.

Two cases of **Paratyphoid B. Infection** treated with Vaccine prepared by cultivating from the fæcal material on Conradi Drigalski medium (*q.v.*) and killing the organisms by heating 45 minutes at 58° C. In this way Vaccine is ready in 48 hours.—W. M. Crofton, B.M.J. ii./13,1373.

See also Edn. XVIII., p. 933.

Vaccinia. Vaccine Lymph (*Therap. Subs. Regns.* 1927 *name*). *Syn.* **Glycerinated Calf-Lymph. Vaccinum Variolæ, U.S. X.** *Syn.* **Vaccino Antivaioloso, Vaccino Jenneriano, P. Ital. V. Vaccinum Antivariolicum P. Belg. IV.**

" Cowpox, or rather the artificially inoculated form of the disease termed *vaccinia*, is nothing more nor less than *variola* modified by transmission through the bovine animal."—Encyclopædia Britannica, to which S. Monckton Copeman contributes the article on Vaccination. For an abstract of the monograph dealing with the objections

urged to vaccine lymph, the needs for efficient vaccination, etc.—*Vide* L. ii./11,1504.

The VACCINATION ORDER, 1929 (framed on the Report of the Rolleston Committee) instructs Public Vaccinators to make single insertions of lymph instead of the previous 4 insertions, multiple insertions being available to those desiring them. Re-vaccination is to be encouraged at the ages of 5 to 7 and 14 to 16. In a covering letter, the importance of primary vaccination in infancy is emphasised, and as 'post-vaccinal nervous disease' occurs mainly in children of school age or adolescents who have never been vaccinated, it is not considered wise to press for vaccination of such persons (unless directly exposed to infection) while the small-pox prevalent in this country retains its mild character. The new Order came into force on Oct. 1, 1929. (L. ii./29,399,411.)

Glycerinated Calf Lymph has advantages over that obtained even from healthy children (as used in the past). Attenuation by passage of the organism through an animal of greater resistance to the disease than man is known as **'Jennerisation.'** The place of insertion should be small, otherwise the reaction is too great. The amount of protection afforded seems to be greater than that afforded by humanised lymph. Glycerinated lymph is recognised as the safest lymph for vaccination, and by the VACCINATION ACTS AMENDMENT ACT, 1898, it is enacted that if a child has not been vaccinated when four months and one week old, the public vaccinator of the district shall visit the home of the child, and shall offer to vaccinate the child with Glycerinated Calf Lymph free of charge.

To meet the requirements of the ***Therap. Subs. Act, 1925 and Regns. 1927,*** the animals used must be healthy, the animal after lymph collection shall be examined *p.m.*, the lymph must be treated with Glycerin or other *partial disinfectants* (*v. postea*), it shall be continuously in cold storage at below 0° C.; each tube shall contain enough for *one human subject.* A label on the box or carton must show the proper name, name and address of maker, number of licence, a distinctive batch number, the date of *completion* of manufacture after testing for organisms, and a statement that the potency cannot be relied on for more than 7 days unless it is kept at below 10° C.

In *emergency* a larger amount may be issued in sterile containers of larger dimensions.

The seed lymph used in this country is derived from Calf Lymph received from Cologne in 1907, its quality being maintained by cutaneous passage *through the rabbit* (repeated transference from calf to calf being found to lead to deterioration).—Min. Health Com. of Vaccination, B.M.J. ii./28,266.

Renner's Vaccine Lymph is free from pathogenic organisms. It has been frequently found good and active on testing it eleven months after having taken it from the animal.

Vaccination Lancets of special form are convenient.

Vaccine Injectors of Rubber are prepared of different forms and **Vaccination Shields** are *sine qua non* in careful vaccination.

N.B.—Vaccine Lymph is destroyed in potency in 36 hours at 37° C. (!), *and a temperature of 57° C. destroys it in 5 minutes. Ice chests are arranged for the Govt. Lymph to maintain at 10° C. Even a temperature of —180° for a long period* (11) *weeks maintains lymph active. Kept 1 year at —5° C. was found more active than that kept at +10° C. same time.—A. Newsholme, M.O., L.G.B.*

Chloroform water has been recommended to replace Glycerin to kill off extraneous bacteria, more rapid effect. Urgent demands for vaccine as in an epidemic, could be met by this method with a supply of vaccine in 14 days, instead of the month or 6 weeks necessary for glycerination.

A rapid process of rendering Calf Lymph bacteria-free.—M. Coplans, Jl. Trop. Med., Apl. 15, '26,122.

For the storage and use of lymph it is recommended to mix lymph 50 parts, glycerin 25 parts, and water 25 parts.—Pr. lx. 284.

Diluted Calf Vaccine. Diluted 10 to 50-fold with N/50 Phosphate solution pH 7·6—or with saline or sterile water. Reduces risk of post-vaccinal encephalitis, and gives more satisfactory 'takes.'—S. P. Bedson, L. ii./29,920.

Differential diagnosis of small-pox and chicken-pox.

The chief points generally relied upon to distinguish chicken-pox from small-pox are the following;

(*a*) The distribution of the eruption, which is found most abundantly on the trunk, and more thinly on the face and hands.

(*b*) The absence of the eruption from the palms, soles and palate, especially in young children.

(*c*) The absence, or short duration, and unimportant character of the pre-eruptive stage.

(*d*) The absence of umbilication of the vesicles in the earlier stages of the eruption.

(*e*) The absence of a pre-eruptive stage.

All these characteristics, however, may fail. In many cases the distribution of the eruption, when scanty, is the same on the face and extremities as on the trunk. Sore throat, accompanied by an outbreak of papules, though usually associated with small-pox, may appear in chicken-pox. Umbilication is often not seen in small-pox at any stage of the eruption, while a slight amount may be seen in chicken-pox. A pre-eruptive stage may occur in chicken-pox similar to that in small-pox.

Other important points, pointing to diagnosis in favour of chicken-pox are the absence of lumbar pain, the presence of elliptical or oval vesicles, continued fever after appearance of eruption, and collapse of the vesicles on being punctured in one spot only.

There are, however, two really reliable signs, at present much neglected which should have preference over all others.

(*a*) The early vesiculation and crusting of the papules, which may occur in so short a period as thirty-six hours.

(*b*) The contemporaneous presence of papules, vesicles and crusts on various parts of the body.—A. T. Brand, B.M.J. ii./22,823.

Cases are missed leading to a sequel of 5, 10, 15 or more deaths, as the case may be. Remarkable difficulty in recognition. Importance of young men familiarising themselves with the subject.—W. McC. Wanklyn, B.M.J. ii./22,775,1045,1092.

Diagnosis. The Voluntary Service fund, of 64, Gt. Portland Street, W. 1, issues 'Accurate diagnosis of Small-pox' (3rd Edition, 1927, price 6d.). There is nothing standing between our people and a small-pox catastrophe but the eternal vigilance of the Medical Profession.—L. i./29,907.

Flocculation test for small-pox. The reaction is carried out with a suspension of the crusts from a suspected case, and a specific flocculating serum made in the rabbit. The reaction found to be specific and of diagnostic value.—L. ii./29,992.

Origin of Vaccination. Benjamin Testy, a Gloucestershire farmer, in 1774, inoculated his wife and family with cowpox to protect them from small-pox. He was stoned for it. In 1796 E. Jenner, the inoculator of small-pox in his district, established the practice of vaccination which the whole world ultimately gripped.—C. Dukes, L. ii./21,1190.

A treatise, historical, bacteriological, giving the method of manufacture of calf vaccine, the glycerination of the same, the filling into tubes, and the bacteriological examination of lymph.—W. H. M., C.D. ii./01,629.

Jenner Centenary Celebrations.—An interesting address by Sir W. Hale-White.—B.M.J. i./23,204 ; L. i./23,137,521 ; Jl. Trop. Med., Feb. 1/23,46.

Varieties of small-pox.—J. C. McVail, B.M.J. ii./23,338.

A concise account of Vaccination as first discovered and practised by Edward Jenner.—See a Lecture by R. T. Hewlett, P.J. i./13,398.

Studies of the viruses of vaccinia and variola.—M. Gordon, B.M.J. ii./25,715. L. ii./25,826,874. See also M. Coplans, Jl. Trop. Med. 15/'26,122 ; *ibid.* May 1/ 26,133.

Combined use of living virus and Immune Serum for immunisation against virus infections. Immunisation against vaccinia and yellow fever has been obtained in monkeys by using Immune Serum and living virus.—J. M. Findlay and E. Hindle, B.M.J. i./31,740. Criticism of immunisation against vaccinia. —J. Bland, B.M.J. i./31,871.

Need for compulsory vaccination.

Germany has a law which enjoins vaccination and re-vaccination (made compulsory in 1874).

Even if the prevalent (mild) type of small-pox can be trusted to breed true, there still exists, side by side with it, the old dangerous type. We may experience a reversion to the horrors of the 18th century.—Prof. Greenwood, B.M.J. i./30,398.

Four out of every five of the population of this country are unprotected by vaccination—(the reproach of Britain.—B.M.J. i./25,621). In an epidemic in Toronto 3000 deaths from small-pox resulted from one mistaken diagnosis of chicken-pox. Discussion of the differential diagnosis of the common exanthemata.—L. i./22,531.

Statistics and General References.

Half century of Small-pox and vaccination.—J. C. McVail, B.M.J. i./19, 297,339,373,408.

Small-pox in Nottingham, June to August 1921, possibly by infection by contact with imported rags, clothes and the like.—B.M.J. ii./21,333.

Inoculation against small-pox in the Shetlands prior to discovery of vaccination. The bacteria were killed by peat smoke and camphor and the virus attenuated by keeping for years underground.—B.M.J. ii./21,912.

Vaccine Lymph subcutaneously as protection against small-pox. 800 patients were tried—the injection given in the arm. 82% showed focal reaction but no superficial vesiculation except where the needle had scratched the skin. These cases were classed as successful. Twelve of the cases were revaccinated in the usual way and did not 'take.' This was regarded as proof that they were protected.—Ind. Jl. Med. Res., per L. ii./21,243.

Small-pox in London. 19 cases during the period July 26th to October 13th, 1922. The outbreak originated in Stepney—a youth of 16. He infected six persons.—For fuller details see B.M.J. ii./22,819.

Small-pox, Treatment of. Solution of Izal used in 1902 instead of Potassium Permanganate. On removal from bath, patient completely bandaged in layers of Alembroth Gauze bandages. The idea was to prevent pustulation by outside organisms. Some cases were confluent, but, in general, the results satisfy.—A. Mearns Fraser, L. ii./22,1303.

Small-pox and vaccination in the Philippines. Published statistics there unreliable.—J. S. McVail, B.M.J. i./23,158.

Small-pox in Central Africa. Small-pox vaccine in powder form deteriorates owing to climate and the long journey from base. Best results obtained by addition of Glycerin to powder.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,35.

Small-pox cases in Willesden.—B.M.J. ii./26,660 ; L. ii./26,781.

Small-pox and variolation in Palestine.—L. i./26,212.

Seasonal incidence in this country in relation to climate. A cold winter and spring likely to result in increased small-pox.—Sir L. Rogers, B.M.J. i./28,300. See also L. ii./26,190.

Impressions of 30 years' experience as Public Vaccinator, covering 40,000 cases. Government Lymph gives better results than others. Absolutely reliable when fresh, but apt to lose activity in hot weather. Perfect results in 40% of infants, but only 5% of working adults. Adult workers should rest from the eighth to the twelfth day—neglect to do this often the cause of many weeks' suffering and the real origin

of the anti-vaccination movement. *Successful vaccination protects against variola absolutely for* 10 *years, considerably for* 15 *years, slightly for* 25 *years* and not at all after 30 years. The best answer to objectors claiming exemption, on the ground that they have been done before, is "If you do not require it, it will not take, so there is no harm in trying."—P. S. Edmunds, M.P.C. Jan. 12/'2731.

It is advisable for all vaccinated persons to keep their bowels well open with saline purgatives.—G. G. Rigby, B.M.J. i./27,779.

Pending changes in the administration of Vaccine under the new **Poor Law Reform Bill** control to be transferred from Boards of Guardians to County Councils and Boroughs.—J. Bennett, L. i./27,271.

An exceedingly mild form of small-pox has been endemic in this country for several years. Ought we not seriously to consider whether a disease which causes such slight constitutional disturbance, so few deaths, and so few (if any) after-results, really calls for the elaborate and expensive system of hospitalisation maintained for it? Moreover, the results of vaccinia are not negligible, and while the number of deaths from small-pox is much overstated, there is a possibility that those from vaccinia may be understated. Is protection against the present type of small-pox worth the price being paid for it? Our views about vaccination are changing and would change even more quickly had it not been a part of the Official creed.—J. W. Carr, L. ii./28,757.

May not small-pox be in process of becoming gradually as innocuous in this country as plague and cholera have already become? It is a tragedy for a child previously healthy to die from post-vaccinal encephalitis, and it is at least fair to ask whether the need for the prevention of small-pox justifies the sacrifice of healthy young lives.—J. W. Carr, L. ii./28,893. Dr. Carr's letter is vitiated by his refusal to face the probability of the future re-introduction of severe small-pox, or the reversion of the present mild type to a severe type.—Sir L. Rogers, *ibid.* 947.

Hæmorrhagic non-pustular small-pox. A case in China.—A. Cannon and S. W. Phoon, B.M.J. ii./30,283.

Small-pox (variola minor), of a mild character, showed increased prevalence during 1930 in London and some parts of the provinces. The total number of cases was 11,839, with 28 deaths. Analysis of 10 years' figures suggests that in an area where the disease has succeeded in establishing itself it tends to increase to a maximum during the 4th or 5th year of incidence and then declines. The present downward trend gives hope that during the winter of 1931 the country may be relieved of the incubus of weekly infections which have ruled during the last decade.—Sir George Newman's Annual Rept. for 1930, B.M.J. ii./31,658.

Post-Vaccinal Rashes, Herpes, etc.

Herpes zester and chicken-pox rashes appearing at the same time. The association is still a matter of speculation. A case of chicken-pox and herpes eruptions within a period of six weeks.—B.M.J. i./26,697.

A child developed a profuse varicella rash following a severe attack of shingles in her grandmother who lived in the same room.—B.M.J. i./26,902.

Painting the face once or twice daily with a ***1% solution of Potassium Permanganate,*** and the arms and hands with *Tincture of Iodine* once daily, *prevents* severe *scarring* and *pitting* in small-pox.—A. Castellani, Int. Conf. Trop. Am. '24,769.

Most post-vaccinal rashes accidental, due to absorption of products from vaccine pustule: specific eruptions less frequent and generalised vaccinia very rare. Rash usually appears on 11th day. In cases of doubt treat as small-pox.—H. D. Chalke, L. i./31,581.

Encephalo-myelitis following vaccination.—L. ii./26,504.

Encephalitis developed in thirty-four cases among 240,000 children vaccinated during a year and a half, at a time when epidemic encephalitis was prevalent. Netter advises to refrain from vaccination during an epidemic of encephalitis.—per Jl. A.M.A. ii./25,779.

Possibility of post-vaccinal tetanus.—J. C. McVail, B.M.J. ii./25,355.

Ministry of Health Committee Report on Vaccination.

Investigations to produce lymph free from extraneous organisms, *e.g.* by growing the virus *in vitro* in contact with chick embryo cells, or by inoculating rabbits intra-cerebrally (the neuro-vaccine of Levaditi) have been carried out. Accepted methods of testing for potency—Gin's Test, Sobernheim's Test,

Groth's Test, Calmette-Guérin's Test. The present method of inspecting the patient on the 7th day should be dropped and replaced by inspection during the second week, with an obligatory second inspection in the third week, also the adoption of stational as distinguished from domiciliary vaccination. There is no evidence that vaccine increases liability to disease either generally or specifically, or aggravates disease already established. The Committee ***acquitted the vaccinia virus*** of being the sole ***cause of post-vaccinal encephalitis,*** but is unable to exonerate vaccination from playing some part, and considers that the co-operation of vaccinia with the viruses of poliomyelitis, encephalitis, or some unknown neurotropic virus, must for the present be accepted as a working hypothesis. The Committee considers that for all practical purposes the period of effective immunity after vaccination may be regarded as not less than 7 years. Owing to the prevalence in this country during the last 5 years of a very mild type of small-pox there has arisen a marked disinclination to submit to adult vaccination, the small-pox causing little discomfort, whereas vaccination means abstention from work for manual workers. The Committee recommends the reduction of trauma to a minimum and considers it possible to secure 100% insertion success by application of lymph to a ***single linear insertion ¼ inch long.***—B.M.J. ii./28,266.

Post-Vaccinal Encephalitis. League of Nations Commission Report.

The report quotes extensively from the Rolleston Committee's Report (see above). The fact is emphasized that the term post-vaccinal does not necessarily imply propter-vaccinal, as ***coincidental disease*** of the brain and nervous system must be allowed for in the millions treated with vaccinia yearly. Encephalitis also occurs as a complication of numerous infections, *e.g.* ***measles and toxæmia.*** The Commission, however, considers that there are practical reasons for viewing ***post-vaccinal encephalitis*** as a *separate* pathological and ***clinical entity.*** The risk may be exaggerated. From 1923–1927 only 139 cases were reported in **Holland** (41 fatal) yet this has been sufficient to cause temporary suspension of vaccination laws relating to children. In **England and Wales** 62 cases, with 36 deaths, occurred from November 1922 to November 1923, and 25 cases with 12 deaths between January 26 and September 27, the bulk occurring in children from 3 to 13. The Commission concludes that the virus of vaccinia itself is not responsible, but rather some unknown factor—a ***filter-passsing*** or ***latent virus.***

Only the treatment to which the lymph seed is subjected determines the quality of the lymph, the origin of the strain used being of no significance. While the passing of the vaccine through rabbits is unobjectionable, neurolapine obtained by intracerebral injections in rabbits, and testicular-lapine, differ from ordinary vaccine. The medical officers of vaccine institutes should themselves undertake human vaccination to study the potency of the lymph they make, the bare report ' successful ' or ' unsuccessful,' being of no value when the vaccine reaction is not described in detail. In primary vaccination the proportion of *insertion successes* should be noted, and in revaccination the reaction should be described as one of three classes : (1) Reaction of primary vaccine type (Jenner's pustule), (2) accelerated reaction (vesicular reaction) : " modified vaccine," (3) allergic or early reaction (papular reaction).

The technique and methods used in different countries should be carefully defined and recorded, and judged in respect of immunity afforded, so that a satisfactory technique for universal adoption may be evolved.—B.M.J. ii./28,582.

Vaccinia affords better protection against small-pox than small-pox against vaccinia. Discussion on post-vaccinal encephalitis.—Prof. J. C. G. Ledingham, L. i./29,231.

A fatal case of Post-Vaccinal Encephalitis after primary vaccination of a boy *aet.* 14, with Government lymph, 4 insertions, 3 of which ' took well.' Patient died 16 days after vaccination, duration of illness being 6 days.—G. N. Grose, L. ii./29,381 ; *cf. ibid.* i./29,221, and B.M.J. ii./29,324.

Further investigation is essential. The vaccinia virus has not been put definitely out of account as a possible etiological agent and the present strain of vaccine used in this country should be scrapped and replaced by a stock vaccine from a country where rabbits are not utilised or by a new stock of variola vaccine cultivated without the rodent accessory.—M. Coplans, W. G. King and W. J. R. Simpson, B.M.J. ii./29,30.

Acute disseminated encephalo-myelitis following vaccination.—C. D. Coyl and E. W. Hurst, L. ii./29,1246.

Post-vaccinal encephalitis in Germany and Sweden. In Germany very rar after re-vaccination and relatively uncommon when primary vaccination i performed under the age of one year.—L. i./30,525.

Lesions of disseminated encephalomyelitis following small-pox indistinguish able from those of the disease following vaccination, measles, etc.—A. G Troup and E. Weston Hurst, L. i./30,566.

Small-pox and vaccination in light of modern knowledge. Post-vaccina encephalitis considered.—J. McIntosh, L. i./30,618.

Zoster, varicella, and encephalitis. Lumleian Lecture on.—W. Russe Brain, B.M.J. i./31,81,104.

A review of recent data. Netherlands, England, outside Europe, Con tinent. Pathology.—L. i. /31,97.

Alastrim. Derived from a Portuguese word meaning 'to spread about'— Amaas, Kaffir Pox and Milk Pox, in different countries, appear synonymous The term, '*mild*' small-pox, is a misnomer. Vaccination is of greatest value but does not afford absolute protection. Points of difference between smal pox and alastrim.—L. M. Moody, Int. Conf. Trop. Am. '24,760-767.

Suggestion to call the two types of small-pox Variola Major and Variol Minor (Alastrim or "Para-small-pox").—L. i./25,92. For differentiatio and interrelation.—See also *ibid.* 29, 101, 153, 199, 205, 225, 352, 359.

Outbreaks occurred in East Anglia and in Jamaica in 1920. The disea on the whole is of extraordinarily mild character. On recovery there is n deep pitting or scarring. The characteristic odour is absent.—L. ii./21,1286 L. i/22,403,502. See also B.M.J. ii./22,65,283; J. P. Leake and J. N. Force per Jl. Trop. Med., June 1/23,199.

Report of outbreak in Antigua, B.W.I.—E. W. R. Branch and W. I McDonald, Jl. Trop. Med., June 15/23,215.

Blood studies in small-pox with special reference to alastrim.—Prof. W. E Hoffmann, Jl. Trop. Med., June 15/23,217.

Whooping Cough (Pertussis). Whooping Cough Bacillus (Bordet Gengou) Vaccine. For details of the Bacillus, *v. Vol. II.*

Is of service in lessening the violence of the paroxysms and shorten ing the duration of the attack. *Initial dose* for infants, 5 millions The dose is to be repeated or increased every 4 or 5 days. Ampoule contain 5, 10, 25, 50, 100, 250 and 500 millions.

As *B. Influenzæ* and the Pneumococcus commonly accompan Bordet's bacillus in these attacks the combination of half the dos indicated above of the *B. Influenzæ* and of ¼ the dose indicated abov of the Pneumococcus is likely to prove beneficial. A Vaccine of thi composition is supplied under the name **Compound Whooping Coug Vaccine.**

Whooping Cough Vaccine appeared of little utility.—D. Paterson and J. M Smellie, B.M.J. i./22,713. But good as prophylactics.—J. F. Rey, *ibid.* 781

Of 100 cases of whooping cough in children from 0 to 12 years, treate with Bordet-Gengou Vaccine, good results were obtained in all but four Three injections intramuscularly of 3000 million bacilli usually sufficient —B.M.J.E. i./26,56.

SENSITISED VACCINES (SERO-VACCINES). Vaccines whic have been treated with the corresponding antisera prior to their use *See Edn. XVIII., p.* 938, *and Edn. XIX., p.* 956.

*** Immunogens** (T.M. 430546).

A series of vaccines of high activity and relative freedom fro bacterial cells and toxins. The following are made: **Gonococcus Gonococcus (Combined), Pertussis, Pertussis (Combined), Pneu mococcus; Pneumococcus (Combined), Streptococcus, Streptococcu (Combined).**

A type of antigen, based upon washing off 24-hour Agar growths of *e.g.* the typhoid bacillus, with Normal Saline, agitating to make a homogeneous suspension, and centrifugalising. Both with this and other organisms the antigens obtained in the washings were found to be more potent than broth filtrates. The toxic principles are left behind, the washed bacteria being practically as toxic as before treatment. Intramuscular injections thought to be best. Promising reports in connection with streptococcal, pneumococcal and gonococcal infections are forthcoming. *Initial dose* of the most useful concentration is 0·5 Cc. with rises to 2 Cc. or more.—Sir Thos. Horder and H. S. Ferry, B.M.J. ii./26,177.

Criticism of Immunogens. Detoxicated and defatted-vaccines found to be clinically inert.—Geoffrey Shera, B.M.J. ii./26360,1243.

Residual Vaccines (Autogenous).

The vaccines are washed in combination with Hydrogen Peroxide.

Of 360 cases, covering a wide range of infections, 294 (81·5%) were successfully treated.—C. E. Jenkins, B.M.J. i./28,340.

✱**Phylacogens** (T.M. 343296) are filtered, sterilised (72 hours) cultures of pathogenic micro-organisms preserved with Phenol 0·5%. The cultures in question include those of **Pneumonia, Rheumatism, Gonorrhœa, Erysipelas,** and '**Mixed Infection**' (advised 'in the treatment of all infections, acute or chronic, in which the condition is not due to a specific micro-organism). Nephritis is a contraindication to their use subcutaneously. Intravenous injection is contraindicated in nephritis, in arteriosclerosis, and in cases with severe and dangerous cardiac involvement. The initial dose should always be given subcutaneously. Phylacogens are supplied in 10 Cc. vials for hypodermic or intravenous use.—Ther. Gaz., Apl., 1911.

✱**Edwenil** (T.M. 514601).

Dose.—2 Cc. hypodermically—sometimes ½ Cc. or less to begin. Doses up to 6 Cc. may be needed. In acute infections repeat dose once or twice in 24 hours; in chronic infections, or convalescence, 2 or 3 doses a week.

Described as the 'natural antibody,' consisting of Calcium in the form of Bicarbonate, a Calcium vehicle in the form of a nucleo-protein, and an unattached globulin element obtained from serum.

Uses.—In endotoxic infections, but without effect on exotoxic infections or protozoal infections, asthma, influenza, measles, mumps, otitis media, pertussis, tuberculosis, etc. *Contraindicated* in conditions in which a sudden swelling might cause embarrassment, or an increase of secretion cause trouble (*e.g.* bronchitis with much secretion), also in cholecystitis and appendicitis.—S. G. Billington, L. i./24,431; Med. World, Jan.–Mar., 1929, and Apl., 1930. In canine distemper.—Vet. Jl. Nov., 1928; Brit. Dental Jl., Dec., '20.

✱**Antibacsyn** (T.M. 522462, class 2 and 522463, class 3, is another preparation on similar lines.

ANIMAL ORGANOTHERAPY.

ANIMAL GLANDS AND TISSUES AND THEIR PREPARATIONS.

The word Endocrine (derivation: ἔνδον within; κρίνειν to separate), meaning 'any internal secretion,' is still much in vogue though it remains customary to speak of 'ductless glands' and 'glands with internal secretion.'

We continue to include in this chapter a number of 'Organotherapeutic' medicamenta in addition to the endocrine glands. Insulin, however, is dealt with under Pancreas on p. 636.

Current views on internal secretions critically examined.—Prof. Swale Vincent, L. ii./22,313; L. i./25,739; B.M.J. i./25,695.

Of the preparations of the 42 organs advertised and prescribed

only one—the Thyroid—was of proven value when given by th mouth.—Prof. Swale Vincent, L. ii./25,332 ; B.M.J. ii./25,1055.

Endocrinology and multiple claims, menstrual, vesical, et reminiscent of all that is bad in theory and practice of therapeutic —Ralph Stockman, P.J. ii./30,556.

GLANDS OF THE BODY DIVIDED INTO 3 GROUPS. (1) Those whi discharge a secretion where it has to exercise its chemical activitie *e.g.* the salivary glands. (2) Those which also have an intern secretion which finds its way direct to the blood stream, *e.g.* t pancreas. (3) The ductless *glands*, *e.g.* the thyroid, parathyroi suprarenal and pituitary.—W. Martin, P.J. i./23,232.

Recent Advances in Endocrinology.—A review of the work fro 1922–1930.—Pres., May, '31.

Animal Membranes for surgical use.

In addition to Goldbeater's Skin, the peritoneum of the ox, t gastro-intestinal mesenteric attachments of the sand-shark, *Cc charias littoralis*, has been used, one of which produces 2 or 3 squa feet of gossamer-texture strong material which can be kept in alcoh

Bone Marrow, Red, Extract.

The marrow of ox and veal-bones and sheep's ribs has been us as a remedy for pernicous anæmia, chlorosis, scurvy, purpur hæmophilia, debility, lymphadenoma and rickets.

***Marrubin** (T.M. 261511).—*Syn.* GLYCERIN EXTRACT OF RE BONE MARROW, **Medullary Glyceride.**

Dose.—1 to 2 drachms, increased if desired.

A thick brown liquid, made by extraction of the veal-bone marro Employed as a substitute for cod-liver oil.

Marrubin has had beneficial effects on weak children, and is sui able for the treatment of anæmic conditions.

SECONDARY ANÆMIA.—Desiccated Red Bone Marrow and Spleen, in equ proportions, given thrice daily in 5 grain doses, gave very definite improv ment in 41 out of 46 cases. Treatment continued for 6 or 8 weeks.—B.M.J. i./25,17. But not of value in pernicious anæmia.—Pres., May, '26,228.

PULMONARY TUBERCULOSIS improved by treatment with Spleen Extra and Bone Marrow, which definitely increased production of erythrocyt and hæmoglobin.—per Jl. A.M.A. ii./25,1513.

The following are made with *dose* 1 to 2 drachms :—

Marrubin cum Pepsina, Marrubin cum Pepsina et Quinina, Marrub cum Bismutho et Pepsina, Marrubin cum Bismutho et Ferrur These are nutrient and digestive.

℗ **Marrubin cum Bismutho et Strychnina,** containing $\frac{1}{120}$ to grain Strychnine in 1 to 2 drachms respectively. Tonic.

Also combined with **Cascara, Tinctura Laxativa, Podophylli Hypophosphites,** and with **Ferric Phosphate.**

℗ **Marrubin cum Arsenio.** Containing in each drachm $\frac{1}{100}$ gra Arsenious Acid. In pernicious anæmia useful.

***Virol.** (T.M. 251002). A preparation of bone marrow, wit malt, egg, and lime. Has nutrient properties for infants.

***Bynotone** (T.M. 399827).—A combination of Bone Marro (12½%), Yeast Extract, together with Hæmoglobin and Malt Extrac In malnutrition in infants, adolescents and adults.

Brain and Spinal Cord Extracts.

These, separately or mixed together, may be tried for the relief of locomotor ataxy, chorea, epilepsy, and melancholia. **Cerebral Tablets**, 5 grains. **Myelin Tablets** contain 3 grains.

Thromboplastin. Made by chopping up and extracting fresh ox brains with equal amount of normal saline—leaving in refrigerator 48 hours, pressing through cheese cloth and adding to the extract thus made after diluting with ½ its quantity of salt solution 0·3% Trikresol. Effectual hæmostatic, especially for oozing surfaces. Much used in cases of hæmophilia in the States, *e.g.* following removal of tonsils and in surgery of bones, glands and nose generally. It maintains its hæmostatic potency for many months.—A. F. Hess, L. ii./15,780.

Anaphylaxis from.—Jl. Ph. Exp. Ther., Nov., 1919.

Ox brain may have beneficial effect on the neurological phenomena of pernicious anæmia, but is not suitable for routine treatment of subacute combined degeneration of the cord unless combined with liver. Suitable cases, *i.e.* those whose neurological condition failed to respond to prolonged liver treatment, improved when given 480 Gm. of minced brain (in 3 or 4 doses with orange juice) daily.—C. C. Ungley, L. i./32,227.

Spinal Cord Extract.

Dose.—5 to 20 minims thrice daily by the mouth or hypodermically. 1 minim is equivalent to 1 grain of fresh spinal cord.

Spinal Cord Tablets, 2½ grains.

Corpus Luteum (*see also Ovarian Extract*).—The yellow material separated from the inert substances of the ovaries, and desiccated. 1=5 of fresh substance.

Dose.—5 to 10 grains in capsules or tablets three times a day. In disordered uterine and ovarian functions, for menstrual irregularity, whether from excess, deficiency or pain; for the vomiting of pregnancy, and for nerve disturbances arising from change of life and consequent upon the removal of the ovaries. There is close complementary relation between the thyroid and the ovaries. Administration of Corpus Luteum and thyroid gland is of value in correcting the various forms of neuroses connected with ovarian atrophy. Has also been tried in anæmia, chlorosis, and Graves' disease.

The Corpus Luteum secretes two hormones, *i.e.* the female sex (follicular) hormone and the specific luteal hormone, which act in an entirely different and partly antagonistic manner to each other, the former accelerating ovulation and estrus and the latter inhibiting and delaying. Both are active during pregnancy. Oral use of extracts containing luteal hormone of no practical value.—Jl. A.M.A. i./26,1423.

Tablets are prepared equivalent to 1 grain of Desiccated Corpus Luteum=5 grains of fresh substance given in nausea of pregnancy.

Possible association with eclampsia. A compound isolated which produces necrosis and changes very similar. It is not present in the placenta.—R. L. Mackenzie Wallis and H. G. E. Williams, L. i./22,784.

STERILITY is said to be capable of treatment by glands. Women with scanty menstruation should receive Corpus Luteum, 5 grains, gradually increased to three times this amount. When associated with excessive obesity and oligomenorrhœa or amenorrhœa they should be treated with thyroid, ½ grain thrice daily.—B. Solomons, B.M.J.E. ii./22,72. Corpus Luteum in the migraine of pregnancy always has good effect.—Luhrs, per Pres., Oct. 23,349. Two substances have been separated from Corpus Luteum called 'luteolipoid' and 'lipanin.' The former has inhibitory action on the menstrual function, the latter stimulated the growth of the genitalia and promoted menstruation. —per Pres., Oct. 23,350. Corpus Luteum preferred to Ovarian substance in vomiting of pregnancy—also recommended for melancholia, obesity and sterility.—per Pres., Oct. 23,351.

***Agomensin** (T.M. 368559). *Dose.*—1 to 3 tablets, each 1/3 grain, thr daily.

A preparation of 'early' Corpus Luteum of the cow. For retarded sex development and genital hypofunction, *e.g.* functional amenorrhœa, d turbances after castration, menopause, sterility and hypoplasia of geni organs.—B.M.J. ii./25,910.

***Sistomensine.** (T.M. 368560). (Prepared under British Patent N 113,311.) *Dose.*—1 or 2 tablets thrice daily.

Extract of the hormone from older Corpus Luteum. Regulates and sta lises (inhibits) menstruation. For dysmenorrhœa.—B.M.J. ii./25,910.

The *Lancet* found that this preparation injected subcutaneously into fem rats produced œstrus.—L. i./27,551,764.

Duodenal Membrane Liquid Extract. *Syn.* SECRETI EXTRACT (glycerinated). Strength, 1 minim=1 grain of the fre mucous membrane of the pig. *Dose.*—5 to 20 minims. **Tabl** represent 5 grains.

Secretin can be extracted from the duodenal membrane with 0·4% Hyd chloric Acid; nearly neutralise whilst boiling to precipitate proteins, wh the Secretin will be left in the filtrate. It is by no means permanent.

Secretin is soluble in water and alcohol.—Bambridge and Menzies, 'Esse tials of Physiology,' 1920.

Uses.—In all pancreatic insufficiencies, where true organic change has n occurred. It aids protein digestion; an important factor in raising low u output to normal; indicated in gastro-enterostomy and jejunostomy; distinct value in nephritis of intestinal origin; increases peristalsis and indicated in all cases of stasis.—Beveridge, per Pres., Oct. '23,344.

Mechanism of pancreatic digestion and function of Secretin.—J. Mellan J. Physiol., May '25,85; per Pres., May '26,208.

See also Vol. II. (Organotherapy).

***Secretogen Elixir** (T.M. 365397.) *Dose.*—1 to 2 drachms (4 8 Cc)

A proprietary preparation of Secretin intended to replace Pepsin and Ac mixtures as indigestion remedy. It is stated to contain pyloric prosecret (with 1/20% of Hydrochloric Acid to change it to secretin) and duoden secretin. Secretogen Tablets (5 grains) containing the duodenal and pa creatic secretins are suggested particularly in faulty digestion of starch, wi fermentation and flatulence.

Leeches. *Hirudo Medicinalis and H. quinquestriatia*—the latte the five striped Australian leech, is also included in *B.P.* '14.

(*To remove leeches lodged in the throat, e.g.*, from drinking wat containing *Limnatis Nilotica.* Paint the leech with strong cocai solution (15 or 20%) and remove with forceps or let it be cough up, patient lying with head hanging. Menthol in Paroleine al suggested. Aspirin has been found to expel leeches from the stomac in the East, *cf.* p. 71.)

Hirudin. *Syn.*—**Leech Extract.**

An active principle from leeches. *Dose*, intravenously, 0·02 to 0·3 Gm. 50 Cc. Normal Saline. Solutions must be freshly prepared. Has been us in treatment of puerperal eclampsia—theory in the 17th Edn., p. 914.

It has the property of maintaining blood in a fluid condition,—1 mgr. ma be dissolved in 0·25 Cc. Normal Saline for the purpose,—this quantity w prevent 7·5 Cc. blood from coagulating without otherwise altering its co position.

Kidney.—Kidney substance has been given in nephritis an other kidney troubles, but the evidence of its value is conflicting.

Phenolphthalein should not be given simultaneously. Massiv treatment said to be essential.

***Nephritin (T.M. B. 493875) Tablets.** *Dose.*—Four tablets four to eight times a day. Dose to be reduced as improvement occurs.

These contain the cortex and convoluted tubules of the kidney, with its internal secretion.

Liver, Desiccated.—1=8 of fresh substance. *Dose.*—5 grains increased to an ounce, on the basis of recent advocacy in pernicious anæmia employing **Powdered Liver Extract** (*vide infra*).

It increases diuresis, thus mitigating toxæmia by removing accumulated toxins.

Pernicious (Addisonian) anæmia has been treated at the suggestion of Minot and Murphy in U.S.A. by means of diet embodying large amounts of mammalian liver, cooked and raw, with plenty of vegetables and fresh fruit, but little fat. Whipple bled and then fed dogs on liver. This led to the discovery that pernicious anæmia can be averted, if not cured, by means of liver. Calves' or cows' liver 250 Gm., beef or mutton 120 Gm., vegetables at least 300 Gm., fruit 250-500 Gm., cream and butter 40 Gm., milk 240 Gm., potatoes or cereals to make up 2000 or 3000 calories, *i.e.*, a diet rich in iron and purin derivatives and proteins, particularly liver, much fruit and fresh vegetables, and relatively low fat. Liver has power of regenerating the blood. Nutritive value equal to red bone marrow.—B.M.J. ii./26,650. All cases treated with benefit.—Minot and Murphy, B.M.J. ii./27,674.

A further statement is : liver or kidneys 200 Gm.; red muscle meat or heart upwards of 125 Gm.; green vegetables not less than 300 Gm.; fruits (grape fruit, oranges, etc.) 400 Gm.; fats restricted to 70 Gm.; bacon, cheese, and dried foods to be avoided ; milk to be limited to 240 Gm., starchy foods not to be taken in excess.—Sir W. H. Willcox, L. ii./27,778. See also J. H. Anderson and E. I. Spriggs, L. ii./27,958.

Of 20 cases 19 were successful at Newcastle Infirmary. Dose to be controlled by blood counts. When cured 8 ounces of liver thrice weekly maintains condition.—J. C. Spence, B.M.J. ii./27,881 ; L. ii./27,1026. *See also* G. Bourne, Pr., Dec.,' 27,373, and B.M.J.E. ii./27,84.

Prelim. Rept. by Med. Res. Council with results in 34 cases.—L. i./28,514.

Liver Preparations of Commerce.

For convenience and keeping in hot climates, the pharmacist can provide the preparation in a palatable form for the treatment. In addition to the above *Desiccated Liver Substance* with dosage as stated, the following Extracts are available.

Concentrated Fluid Extract of Liver is of strength 1 ounce represents 8 ounces of fresh liver. *Dose.*—$\frac{1}{3}$ to 1 tablespoonful daily, divided into 3 doses with meals, each with the juice of an orange.

Powdered Liver Extract.

Dose.—The contents of two tubes, each=$\frac{1}{2}$ lb. (250 Gm.) of fresh liver.

Preparation. The M.R.C. gives the following method. To 100 kilos of minced fresh ox liver add 132 litres 80% Alcohol and 109 Cc. 50% (vol.) Sulphuric Acid. Stir frequently and filter after 12–18 hours. Evaporate the filtrate *in vacuo* to 10 litres. Add 10 litres of Absolute Alcohol and remove supernatant liquor from the flocculent precipitate. The residue is centrifuged and washed with 50% Alcohol. The Alcoholic liquor and washings are mixed,

evaporated *in vacuo* to a small bulk and then poured with stirring into 10 v of Absolute Alcohol. The toffee-like material which forms is pulled into shr to expose fresh surface to the dehydrating action of the Alcohol, which renewed as required. When the material becomes brittle it is filtered off a dried *in vacuo* over Sulphuric Acid, powdered rapidly and again dried, and th filled into tubes, each of which should contain an amount equivalent 250 Gm. of the original fresh liver.—P.J. i./28,299.

Another method consists in precipitating one part of the concentrated pressed juice with 2 parts of Acetone and drying the product below 60° C P.J. ii./28,479.

It is reported that red blood corpuscles content and Hæmoglo percentage improve remarkably after a month's treatment.

Erythgen Liver Extract. *Dose.*—1 to 4 drachms thrice dai Capsules, 1 to 4 thrice daily.

✱**Hepatex** (T.M. B. 511881). A liquid extract. *Dose.*—1 drachm 2 ozs. fresh liver.

✱**Hepatex** (T.M. B. 511881) **P.A.F.**

A purified and potent extract (5 Cc.=100 Gm. fresh liver) giv intravenously or intramuscularly. Practically free from prot and does not affect blood pressure.

Dose.—5 Cc. undiluted injected in 2 to 2½ minutes, either week or per day according to severity of case. Intended to supp ment oral therapy during critical stages, but may be used as s treatment.—J. F. Wilkinson, L. ii./31,791.

It is intended as a companion to Hepatex for use where liver *per o* not desirable or is only partly effective, or where speed is essential

Home-made Liver Extract. Extract 10 ozs. minced beef li with cold water. Precipitate inert proteins by boiling and strain The clear yellow liquid obtained equals in activity the origi amount of liver when ingested. Volume of liquid should be ab 18 fluid ounces.—P.J. ii./31,50.

Raw liver may be cut up into small pieces and put in cachets a immediately swallowed. The method dispenses with cooks, minc machines, and cooking apparatus, and treatment may be continu without nauseating.—D. G. Falconer, Pr., Dec., '31,687.

Vitamin B content in commercial preparations. 10 out of contained adequate amounts.—E. Gilroy, L. ii./31,1098.

References to Use in Pernicious Anæmia.

Reports from hospitals confirm it is a specific.—L. i./28,863; H. F. Bre and F. R. Fraser, B.M.J. i./28,165; *ibid.* 178,188, and M.R.C. Rept., *i* 398,463. See also Pres., Jan. '28,3 and 47–56.

If treatment is discontinued, relapse will occur. Combined with ol methods, 3 or 4 ounces of minced liver a day is effective. Over-use of li may cause gout or chronic nephritis.—C. H. Melland, B.M.J. ii./29,11.

Report of Committee of Harvard Medical School.—Jl. A.M.A. ii./29,144

Decline in mortality caused by Liver Treatment.—P. L. McKinlay, L. 29,1086.

A case not responding to liver treatment for over 2½ years. Patien weight well maintained throughout.—A. C. Hampson, L. i./30,22.

Liver Therapy may be largely symtpomatic.—L. i./30,92.

Intravenous use would be ideal.—Janet Vaughan, B.M.J. i./31,5

Intravenous injection of Liver Extract.—W. B. Castle and F. H. Las Taylor, L. i./31,857.

If no definite reticulocyte response by 5th day it is not worth while i sisting with liver treatment.—S. C. Dyke, B.M.J. i./31,584.

Glycerol of Pepsin and an acid mixture should be added to the liver tre ment (raw fresh juice).—H. C. Keates, B.M.J. i./31,894.

Secondary Anaemia. In pernicious anæmia it is an established treatment. In some cases of secondary anæmia the therapy is effective in producing reticulocyte response and raising blood count. Best results after hæmorrhage. Give Iron simultaneously, *e.g.* Pil. Ferri, 5 grains, three times a day.—S. C. Dyke, L. i./29,1192,1206. Liver of little value.—L. ii./30,704.

DIABETES. Liver was regarded as unsuited for diabetics because of its Glycogen content; it is now known to contain a blood-sugar reducing substance when taken by mouth, non-toxic and with effect similar to Insulin. 180 Gm. of raw liver may have an effect on blood sugar of diabetics equal to that from 10–15 units of Insulin.—H. Blotner and W. P. Murphy, Jl. A.M.A. i./29,1336. The preparation made on these lines of Blotner and Murphy ***had no effect on diabetes*** —R. D. Lawrence, L. ii./30,1179.

HÆMOPHILIA. Value of Liver treatment demonstrated by Pickering.—B.M.J. i./31,33.

THROMBOPENIC PURPURA of moderately severe grade with oozing from gums and ecchymoses rapidly yielded to Liver treatment.—F. H. Jacob, B.M.J. i./31,33.

DISSEMINATED SCLEROSIS treated by liver, lightly cooked, ½ lb. daily, with remarkable results. Method evolved in the hope that the nervous system might benefit, on the lines of pernicious anæmia.—A. Goodall and J. K. Slater, B.M.J. i./31,789.

Depressor principle of hepatic tissue. It is a non-protein. The active agent is soluble in 80% Alcohol, can be separated from an accompanying pressor substance, and further purified by solubility in Ether. It depresses arterial tension and maintains it at subnormal level for a long time.—Jl. A.M.A. ii./25,194,251,750.

Anabolin. *Dose.*—½ to 2 Cc. intramuscularly daily.

Tablets. *Dose.*—1 to 3 a day, for use *per os*, are also made.

The preparation is a liver extract stated to stimulate hepatic detoxication and reduce high blood pressure, with consequent improvement in health. ✱Anabol is T.M. 457107.

Lymphatic Glands. **Tablets** 5 grains each. *Dose.*—1 thrice daily.

Have been used in enlarged tonsils and adenoids. The method consists in supplying lymphoid tissue artificially.

Mammary Gland. **Tablets** contain 2 grains of desiccated gland.

Has been used in the treatment of uterine congestion, fibroid tumours and in menorrhagia.

The endocrine basis of pernicious vomiting in pregnancy. Mammary substance by mouth or hypodermically (10% extract) produces startlingly good results.—W. Dickson, Pr., May '26,365.

Mammary Extract is inactive.—J. H. Burn, C.D. ii.2/6,727.

Mucin. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**).

This is the essential constituent of the secretions of mucous membranes, buccal, nasal, pharyngeal, etc. It is precipitated from these by alcohol and by acetic acid. The saliva produced by the submaxillary and sublingual glands contains it, but not the parotid. It may be procured from areolar or connective tissue, and from bile.

Taken internally, *e.g.* **Tablets,** containing Mucin 5 grains with Sodium Bicarbonate 5 grains, relieves painful digestion, gastritis and gastric ulcer. In the form of **Nebula** containing Mucin 5 grains, Sodium Bicarbonate 5 grains, Menthol 1 grain, Lime Water ½ ounce, Distilled Water ½ ounce, has been found of value in dry catarrhs, rhinitis, etc., pharyngitis, and where incrustations are present on the laryngeal lining.

Superior to all other treatment in many throat and stomach complaints, *e.g.* gastric ulcer. Powdered hog's stomach possibly only acts by virtue of the Mucin contained.—W. Stuart-Low, B.M.J. ii./31,124.

Muscle Extract (Extract of Heart Muscle). In angina pectoris and intermittent claudication. Inhalation of Amyl Nitrite tends to abolish a phenomenon of muffling heart sounds on contracting a muscle. Some sort of antispastic substance may be at work during

the contraction of active skeletal muscle. Might be obtained fr skeletal muscle of a healthy young animal to counteract the spa of angina pectoris. Still in experimental stage.—M. S. Schwar mann, B.M.J. i./30,855.

A powerful depressor in vascular disease. **Myoston** (G. Henning, Ber also used.—M. S. Schwartzmann, B.M.J. i./31,493.

✱**Lacarnol** (T.M. 492088). *Dose.*—On the 1st day 1 Cc. intramuscula once or twice a day, and 15 or 20 drops *per os*. On following days *per os* or dose being reduced until 5 or 10 drops are given two or three times da An extract of heart muscle. True angina pectoris and other forms benefit —B.M.J.E. i./31,82.

Myoston, Eutonon, Myotrat, Kallikrein, Lacarnol, Angioxyl, etc., all h essentially similar action; none can replace Digitalis in myocardial weakn or cardiac irregularity. Use not entirely without risk and caution necessa Precise use and limitations still to be determined.—L. ii./31,28.

Ovaries. **Tablets**, 5 grains.

In dysmenorrhœa and menorrhagia, and for climacteric ailmen Chlorosis, mental disease and hæmophilia have been treated. *See a Corpus Luteum*, p. 949.

OSTEOMALACIA treated with Ovarian substance.—Pres., Oct. '23,348.

GRAVES' DISEASE in women treated with Ovarian Extract, a series of to 20 injections of the fresh product being given, 0·2 to 0·25 Gm. injec daily. Injections associated with administration of Hyoscyamus.—B.M.J i./26,31.

For earlier references. see Edn. XIX. p. 963.

Ovarian Hormone.—Standardisation is by noting the power to prod œstrus in ovariectomised animals, a large number being used. The unit Œstrin is taken as the amount required to produce œstrus in 50% of the anim tested, 20 animals being used for each test.—K. A. Coward, B.M.J. ii./27,10 See also *ibid.* ii./25,705 and Sistomensin.

Preparation of the hormone from pigs' ovaries, according to method Allen and Doisy; Hermann and Fränkel, and Dickens, Dodds and Wrig —L. i./26,26. Activity of, confirmed at the Middlesex Hosp.—Swale Vince B.M.J. ii./25,1056. A brown oil, soluble in Alcohol and free from Chol terol. Produces continuous œstrus in ovariectomised animals. Effective the mouth. Has marked depressor effect, and inhibits blood-sugar red ing action of Insulin.—Dickens, Dodds and Wright, Biochem. Jl., '25, XI No. 5, 853; per Pres., May '26,216.

Method for obtaining ovarian hormone in a water-soluble form by extr tion from placenta.—F. Dickens and co-workers, L. i./27,1016,1182; see a E. Laqueur, L. i./27,1126, *re* 'Menformon.'

From the ovary at least three different substances can be obtained—Œstr Corpus Luteum Hormone, and Interstitial Hormone. Œstrin when inject subcutaneously into spayed rats produces typical œstrus; Corpus Lute is concerned with the prevention of ovulation; and the interstitial hormo causes a secretion of the posterior pituitary lobe.—W. E. Dixon, B.M.J. 27,213,1070.

Not until extracts are made from animals' ovaries during either pro-œstr or the early months of pregnancy can any uniformly satisfactory therapeu results be expected.—B. Whitehouse, L. i./27,1279.

✱**'Varium'** (T.M. 260858) is a trade brand of Ovarian Extract.

Ovamammoid Compound Capsules.

Dose.—1 thrice daily ½ hour before meals and one at bedtime.

Contain 1 grain each Ovarian Extract and Mammary Gland Extract.

Used in neurasthenia, hysteria, insomnia, chlorosis, amenorrhœa and dy menorrhœa. Stated to be a galactagogue and emmenagogue.

Solutions of ovarian residue without corpus luteum, 1 Cc. intramuscular used as a routine in labour. Uterine contractions increase rapidly in for and frequency without increased pain. Also of value in placenta prævia. D. C. Macdonald, B.M.J. ii./29,517.

Ovary hormones, recent work on.—L. ii./29,1108.

Oil and water-soluble ovarian extracts—œstrus-producing hormone. Clinical deductions.—L. ii./29,1367,1373.

Œstrus-producing hormone in crystalline form.—L. i./30,94.

Amenorrhœa treated with Œstrin. Menstruation re-established or affected. —E. C. Dodds and J. D. Robertson, L. i./30,1390.

Œstrin in ovarian deficiency.—H. Gardner-Hill and J. Forest Smith, L. i./31,464.

***Menformon** (T.M. 467043).

An ovarian hormone preparation. Increases metabolism in female but not in male castrates and has an anti-masculine effect. It may be given subcutaneously.—E. Laqueur and S. E. de Jongh, Jl. A.M.A. ii./28,1172.

Theelin.

The ovarian follicular hormone isolated by E. A. Doisy. Used in amenorrhœa and disturbances of the menopause. Issued in 1 Cc. ampoules for intramuscular injection.

***Ovarnon** (T.M. 507052).

Dragées containing 0·15 Gm. desiccated ovarian gland. For ovarian disorders.

***Progynon** (T.M. 492156).

A preparation of the female cyclical hormone given *per os*. Stated to be of value in climacteric disturbances, defective menstruation, etc.—B.M.J. ii./29,1205.

Pineal Body. *Syn.* CONARIUM. A small reddish grey vascular body situated behind the third ventricle which is embraced by its two peduncles.

The functions of the pineal gland are little known. Extracts of it act as diuretic and galactogogue. There appears to be some antagonism between the pineal and pituitary bodies. It may have an effect upon nutrition and growth, upon sexual development and upon intelligence. It has some connection with accumulations of fat in the subcutaneous tissues.

Pituitary Gland. *Syn.* **Hypophysis Cerebri.**

A small reddish-grey vascular body, a ductless gland, weighing in man about 10 grains, situate at the base of the brain. The average total weight of the Gland in the ox is 2·5 Gm. ; anterior part being 2 Gm. and posterior 0·5 Gm. It is said that 8,000 head of cattle are required to produce 1 lb. of dried posterior gland—one would have expected nearly twice the amount—arguing on a 20% dried substance yield.

Anatomically, the gland consists of three parts—the anterior lobe, the *pars intermedia*, and the posterior lobe. The anterior lobe is the larger, and is made up of cubical or polygonal epithelial cells, —in structure it is rather like the fœtal thyroid. Disease of this portion is associated with acromegaly. The *pars intermedia* lies between the anterior and posterior lobes and is developed in connexion with the anterior lobe. The posterior lobe is connected with the floor of the third ventricle, from which it is developed by the neck or infundibulum=a funnel. In man both neck and body are solid with traces of a cavity in the neck.

Physiologically.—In the earlier days the function of the gland was thought to be secretion of nasal mucus, hence the name (*pituita*= mucus or phlegm). Removal of the entire gland leads to depression, muscular weakness, dyspnœa and emaciation. Removal of the anterior lobe leads to genital infantilism (*cf.* however J. A. Walton, *infra*). *Insufficiency* of the pituitary gland is associated with

weakness, wasting, etc. *Excessive secretion* is followed by h arterial tension, polyuria, glycosuria and acromegaly.

Histology indicates that the *anterior* portion is the active part, t posterior being merely a *vestigial* structure, but *physiologically* t opposite is the case—an extract of the whole gland may be us therapeutically, but the posterior lobe is of greater importance a value, as described later.

Functions of the Pituitary Gland. The anterior and poster parts appear to have entirely different functions.

The anterior lobe controls metabolism and growth of the skeleton. Sho oversecretion be delayed until adult life, there will be an irregular overgrov of bone and connective tissue, giving rise to acromegaly. In addition, i probable that the overgrowth of the gland is associated with changes the sexual glands, for most cases of acromegaly are clearly asexual.

Pars Intermedia. It is held by many that all the effects described as c changes in the posterior lobe are really due to changes in the pars intermed

Posterior Lobe. The effects of administering extracts of this portion well known. (1) Pressor effect. (2) Depressor effect.

(3) Diuretic effect. (4) Galactagogue effect.—The increased flow of m in lactating women is only of short duration ; the daily flow is not increase It is increased excretion rather than increased flow (Blair Bell).

(5) Stimulative effect on unstriped muscle.

(6) Effect on carbohydrate tolerance. Many diseases of the pituitary gla are associated with distinct and definite change in the patient's tolerance Carbohydrate, so not infrequently there is glycosuria, *e.g.* in acromegaly. T paper contains a good account of acromegaly and surgery of the pituit gland.—J. A. Walton, B.M.J. ii./22,835.

Pituitary ' extract ' is secreted into the cerebro-spinal fluid (Cushing, c firmed by Dixon). The only substance increasing the action of Pituitary cerebro-spinal fluid was ovarian extract.—B.M.J. i./23,106.

Histamine is present in the hypophysis. It plays an important role stimulant for the gastric and intestinal musculature and as a dilator of ca laries during digestion. We daily consume a considerable amount of it J. J. Abel and S. Kubota, Jl. Pharm. and Exp. Therap., June, 1919, a Nov., 1919.

J. H. Burn and H. H. Dale demonstrated that ***histamine ar adrenalin*** are ***antagonistic*** that by acting respectively as dila and constrictor they maintain and adjust circulation of the blood to t needs of the tissues. The injection of adrenalin into the blood stream cor sponds to that outpouring from living gland which accompanies und emotional stress due to anger or fright. Obviously this latter is abnorm and the objective of curative medicine must be to restore harmonious worki of the secretory organs and the liberation of minute amounts of regulat hormones.—Trend of Therapeutics, C.D., Oct. 16/26,603.

DISPITUITARISM, OBESITY AND INFANTILISM. An account of the functio of the pituitary gland and treatment.—L. Tidy, L. ii./22,597.

Ovarian conditions determine the liberation of Pituitrin. The ovari drug is set free in the circulation ; it causes the liberation of Pituitrin a the uterus is affected.—Prof. W. E. Dixon, B.M.J. ii./22,410.

Berman suggests that the posterior portion of the pituitary gland responsible for the differentiation of sexual types. The failure of the poster portion of this gland therefore makes hermaphroditism. Of the anter portion of the gland, it is more or less established that failure in the ma is an essential condition, if not the sole cause of Fr.lich's syndrome. So element of power in character make-up is undoubtedly atrributable to t pituitary factor. Imagination is another psychic factor that we have m also be associated with the pituitary. In short, a rough classification important hormones would be :—***thyroid for creation; pituita for subjective power and adrenal for objective powe*** —H. Crichton Miller, B.M.J. ii./22,552.

The influence of the ovary on pituitary secretions—a probable factor parturition.—W. E. Dixon and F. H. A. Marshall, Jl. Physiol., Dec.'24,2 per Pres., May '26,200.

The pituitary gland has a definite function in determining the conservati

or *excretion of water and chlorides*, and it is possible that this control is exerted over other constituents of the urine as well. Chloride and phosphate excretion may be affected in opposite directions by pituitary extract.—R. L. Stehle and W. Bourne, Jl. Physiol., July '25,229, per Jl. A.M.A. ii./25,855.

Pituitary gland not essential to life. Providing the hypothalamus is not injured, complete removal of the pituitary does not lead to death in animals. —Pres., May '26,200. See also Jl. A.M.A. ii./25,2037.

Relation of the anterior lobe to the reproductive organs.—C. W. Bellerby, L. i./28,1168.

Dried Pituitary Preparations.

Of these, there are three, made respectively from the **Entire Glands**, the **Anterior Lobe** and the **Posterior Lobe** :—

(i.). **Pituitary Body, Dried** (**Entire Gland**) of the ox.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily.

Five parts of fresh gland yield about 1 of dried gland.

TABLETS of this dried entire gland contain 0·06 Gm. (1 grain).

Uses.—Has been employed to improve metabolism, to raise arterial tension, to increase diuretic action and to improve appetite. Given in menstrual disorders and in exophthalmic goitre and with Thyroid (*q.v.*) in obesity.

Small doses, *e.g.*, 1 grain of desiccated gland, are thought to be practically useless in most cases. Five to ten grains thrice daily may be regarded as a minimal dose. Very large doses, *e.g.*, 100 grains thrice daily, have been given without any apparent ill effects.

F.E. VIII. has a preparation of this kind. 1=4 of fresh gland.

(ii.) **Pituitary Substance Dried** (**Anterior Lobe** *only*).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). 4·5 parts fresh substance yield 1 part of dried substance. **Tablets** 2 grains each.

Uses.—Has been thought to exercise a stimulating action upon growth. The anterior lobe has been given in certain types of obesity, also in later stages of acromegaly but not earlier stages; also in bronchial asthma.

An increase of secretion by the anterior lobe before completion of growth produces gigantism, and if growth is completed before this hypersecretion the result is acromegaly. Overgrowth of the lobe is associated with changes in the sexual glands: undergrowth results in infantilism. It also seems to have specific influence on the female gonads (this factor is utilised in the **Zondek Aschheim test** for pregnancy).—Pres., May, '31,967. The test has been adversely criticised.

Zondek considers the sex-stimulating autocoid to be of a dual nature, one portion influencing the ripening of the follicle and the other the formation of the corpus luteum, termed respectively *Prolan A* and *Prolan B*, making four autocoids in the anterior lobe affecting growth, œstrus, corpus luteum and metabolism.—per Pres., May,'31,195.

Zondek and Aschheim's Pregnancy Test of no value, but clinically the test (injection of urine of patient into mice and observation for corpora lutea or corpora hemorrhagica) seems reliable.—Prof. E. C. Dodds, L. i./30,36,39. See also B.M.J. i./30,150.

F. A. Crew and B. P. Wiesner name the sex-factors *Rho-one* and *Rho-two*, with a fourth hormone, thyreotropic in nature called *Theta*.—B.M.J. i./30,777.

Thyroid and anterior pituitary deficiency generally exist together. The dull adenoid type of child often improves on combined treatment.—T. Bodley Scott and F. W. Broderick, Pr., Oct., 1921, p. 278.

INFANTILISM and certain types of amenorrhœa, associated with minor

degrees of infantilism treated with anterior lobe by the mouth.—H. Gardin Hill and J. F. Smith, L. ii./26,222.

Extracts of the anterior lobe of Pituitary Gland, of the Ovary, and of t Mammary Gland, are likely to have no therapeutic action when given by t mouth.—J. H. Burn, P.J. i./27,356.

(iii.) **Pituitary Substance Dried (Posterior Lobe *only*).** *Sy* PITUITARIUM. U.S. X.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). (U.S. average ½ grai 4·5 parts of the fresh substance yield about 1 of dried substance.

Uses.—Has been used in exophthalmic goitre, acromegaly and b its action on the circulatory system, to relieve cardiac dilatatic in intestinal paresis, diabetes insipidus, amenorrhœa and enuresis.

For further details see Pituitary Extract—the liquid equivalen

Liquid Pituitary Preparations:

(i.) **Pituitary Extract Liquid of *Entire* Gland "*Special.*** *Dose.*—½ to 1 Cc. intramuscularly into the buttock. **Sterul** ½ and 1 Cc. are prepared.

Strength 1=1 of fresh ***entire*** gland.

Use.—This has been tried in certain types of acromegaly attribu able to disease of the pituitary. It is advised to start with ½ C daily and watch the case.

Whole gland Pituitary, if combined with Thyroid, effective in pituita disorders.—F. Edmonds, B.M.J. i./31,498.

(ii.) **Pituitary Extract Liquid (Anterior Lobe).**

"**Sterules,**" Hypodermic, of this preparation, 1 Cc. and 2 C (in each instance) are made of 20% and 40% strength of fresh glan They have been given tentatively in retarded growth in childr with some evidence of benefit, but it is generally considered th the anterior lobe yields no activity to aqueous media so far as can b detected.—*Cf.* F. W. Gamble, Chairman's Address, B.P. Conf., 192 and J. H. Burn, C.D., ii./26,727.

Antuitrin. A preparation of the anterior lobe of the pituitary for u in diseases of metabolism, delayed development and derangement of t genito-urinary system. *Dose*, hypodermically 0·5 to 1 Cc.—L. i./22,22.

(iii.) **Pituitary Extract Liquid.** (*Infundibular*—i.e., from t posterior lobe.) *Syn.* "**Pituitary (Posterior Lobe) Extract** (*Therap. Substances Regulations* 1927, *name*), **Extractu Hypophysis Cerebri Liquidum, Liquor Hypophysis,** F.E. VII

Liquor Pituitarii U.S. X.

Dose.—½ to 1 Cc. of an extract of Fresh Infundibulum (10 uni per Cc., assayed biologically as described *infra*), *given intramuscular* to secure prompt action and to avoid superficial sloughing from loc vaso-constriction. May be repeated at 1 hour intervals.

A sterile solution containing the active principle of the posteri lobe of the gland of the ox.

'**Sterules**' **of Pituitary (Posterior Lobe) Extract.**—½ and 1 Cc. a prepared containing 5 and 10 units respectively.

Doses of ½ Cc. are usual for *obstetrical purposes* and 1 Cc. or mo or *surgical requirements*, to raise blood-pressure in surgical sho

and post-anæsthetic collapse. In urgent cases the Extract may be administered *per rectum* or intravenously diluted with Normal Saline.

In labour, a dose of 2 units may be expected to hasten a sluggish labour, provided that it is not given before the os is about half dilated. This dose may be safely given at any stage if there is no mechanical obstruction, and its effect may last longer than an hour, which is the least interval at which a dose can be usefully repeated. —A. Bourne and J. H. Burn, P.J. ii./27,485. See also L. ii./27,560 ; Jl Obstet. and Gynec. Vol. 34, No. 2, 249.

✱**Infundin** (T.M. 349279). ✱**Pitibulin** (T.M. 384472), **Pituitarin**, ✱**Pituglandol** (T.M. 417404) and ✱**Pituitrin** (T.M. B.440186) are solutions of the Infundibular Extract.

Tethelin has not all the properties of Pituitary Extract and is believed to be the mother substance of the active principle of the posterior lobe.—T. B. Robertson and L. A. Ray, Austral. Jl. Exp. Biol. and Med. Sci., Dec. 16, '25, 173, per Pres., May '26,200. For further details *see* Edn. XVIII., p. 953.

The growth-promoting properties of Tethelin are unmistakable.—Richardson and Horning, Med. Jl. Austral., Mar. 10, '30, per Pres., May '31,194.

Preparation of Pituitary Extract is by exhaustion with acidulated water.

Recognition.—Pituitary liquid gives the biuret reaction. Alkaloidal precipitants such as Phospho-molybdic Acid, Phospho-tungstic Acid, Bromine Water, etc., all give faint but distinct precipitates of the active principle.

Assay.—U.S. X. assays biologically, comparing activity of the water-soluble principles upon the isolated uterus of the virgin guinea-pig with that of a standard preparation.

The **Second Conference on Biological Products.** decided it was desirable to express all Pituitary Extracts in units of activity ; the activity corresponding to 0·5 mgr. of the standard powder is one unit. Thus, the extract of the U.S.P. contains 10 international units per Cc.—B.M.J. ii./25,534.

The standard powder contains the activity of 7 times its weight of fresh gland, hence the International requirement for a 10 unit preparation, in terms of fresh gland, is that 1 Cc. should contain the activity of 35 mgr. of fresh gland. In other words, the U.S. X. and other 10 unit preparations are actually 3·5% extracts of fresh gland. Assuming a loss of 2/5 activity in manufacture, *it should*, we understand from Dr. Burn, *be possible to produce a* 10 *unit preparation by making a* 6% *extract of fresh substance.*

The **League of Nations Commission** on the Standardisation of Serum, Serological Reactions and Biological Products recommended that the dry preparation of the Acetone-extracted fresh posterior lobe substance of ox-pituitary be now definitely adopted as the **International Standard** preparation for the biological evaluation of preparations of the posterior lobe of the pituitary, whether containing all the active principles of the lobe, or the pressor or oxytoccic principle only, in separate solution.—B.M.J. ii./28,111. The standardisation of Pituitary Extract against Histamine is recognised as unsound.—*ibid.*

Therapeutic Substances Regulations, 1927. The Standard Preparation is a dried Acetone-extracted substance from posterior lobes kept at the Nat. Inst. of Med. Research, Hampstead. The ***Unit*** is the activity corresponding to that yielded by ***0·5 Mgr. of the Standard Preparation*** when extracted by an approved method (*cf. antea*). The acidity of the aqueous extract shall be not less than *p*H=5 nor more than *p*H=4. Samples must be tested for sterility and the label must indicate the strength

(units per Cc.), Batch No. and Licence No., and name and addre of manufacturer.

The expiry date for preparations is two years, though this is not stated the Act.

Therapeutic Substances Act. Two samples of Pituitary in 1930 failed reach the standard.—P. Hartley, B.M.J. i./31,1072.

Earlier Reports on Physiological Examinations.

We may recall that in 1917-1919 we had a number of examinatio made of our preparations by a Professor of Physiology in Londo The reports were devoted to Blood Pressure, Kidney Volume, Flo of Urine, and Action on the Uterus and Milk Flow. These repor were highly favourable. Full details are given in the XVIIIt Edn., pp. 954, 955.

Pituitary Extracts made with different concentrations, 0·05% to 6%, Acetic Acid, giving extracts of pH 7·0 to 3·4, showed no deterioration their oxytocic activity.—A. Stasiak, Jl. Ph. & Exp. Ther., July '26,7.

Uses.—Pituitary (Posterior Lobe) Extract causes uterine co traction and has a special action on uterine muscle. It stimulat unstriped muscle, especially affecting also the arteries, spleen ar intestinal muscles. Should not be injected during the first stag of labour, because if the *os uteri* is not fully open the energet contractions may cause a rupture of the uterus. It keeps bloc pressure raised for hours; but in no way supersedes or takes th place of Saline infusions. It is useful in shock and has contr over post-partum and other uterine hæmorrhage.

Contra-indications may be heart disease, arteriosclerosis and kidn disease. In arterial disease of the aged sudden increase of blood pressure b pituitrin might cause apoplexy.—L. i./15,289. See also M.P.C., Jan. 7/20.

N.B.—The Extract produces arterial degeneration if administered t long—it is a remedy for emergency, not routine use.

When a second or subsequent dose is wanted the fresh dose w not produce more than a small fraction of its effect unless son time has elapsed.

Exophthalmic goitre has benefited. Effect on the kidneys poin to use in suppression of urine. May control hæmorrhage, *e.g.*, typhoid fever. Its effect upon metabolism has led to its use acromegaly and skin affections. *See also the following abstracts f further uses.*

References.

ACROMEGALY. Some good appears to come from its use in a fair proportio of cases.—Guthrie Rankin, L. i./09,28.

Pituitary body and optic chiasma lesion with acromegaly benefited b Pituitary and Thyroid Extracts. Special Extract of the anterior pituita lobe alone—used with some sign of benefit.—L. i./11,303.

ADDISON'S DISEASE: Two cases benefited.—O. Leyton, B.M.J. i./15,245.

F. Golla was the first to use Pituitary Extract. Subcutaneous injectio produced marked rise of blood pressure and diuresis. Action on the uter said to last longer than that of Ergot. Useful in treatment of hæmorrhag intestinal paresis and shock.—L. ii./10,1828.

CANCER as palliative.—J. H. Norgate, per Pres., June '23,238

On the hypothesis that the anterior pituitary in cancer is over-active an the posterior under-active, 5 cases of advanced cancer were treated wi Pituitrin 0·5 to 2 Cc. twice daily and Theelin 0·25 to 0·5 Cc. once daily, with low carbohydrate diet. All showed regressive changes in the tumours an

life definitely prolonged. Pain following injections controlled by Morphine. Reduce or stop Pituitrin if urine output falls below 20 ounces. Regressive changes deemed sufficient when temperature varies between 97° and 99°.—W. Susman, B.M.J. ii./31,798.

CHRONIC CONSTIPATION IN INTESTINAL TOXÆMIA well treated with Pituitary Extract hypodermically and *per os*.—Glas. Jed. Jl., Sept. '13,177.

The use of Pituitary Extract to promote peristalsis in young infants is fraught with danger, since it readily produces intussusception.—J. A. Foote, Jl. A.M.A. ii./25,722.

Constipation due to Morphine corrected by 1 Cc. of extract.—E. Obermer, B.M.J. i./26,17.

Paralytic distention of the intestines—possibly of value in.—New and Non-Off. Remedies, 1914. See also G. R. Murray, Clin. Jl., Aug. 1/23,364.

Diabetes. Subcutaneous injections of Post-Pituitary markedly antagonise the effect of Insulin on blood-sugar in normal and diabetic individuals.—R. D. Lawrence and R. F. L. Hewlett, B.M.J. i./25,998.

Growth and sugar tolerance increased in children by Pituitary anterior lobe *per os*.—H. Gardiner-Hill, B.M.J. ii./25,1056.

Diabetes insipidus treated by 2 Cc. of injection hypodermically.—B.M.J. ii./18,197. Antidiuretic effect marked.—M. Davidson, L. ii./20,401. *See also* P. J. Cammidge, Pr., Oct. '20,244.

A combination of dried Pituitary Extract 1/10 gr. and Ergotin 1 gr., in a capsule three times daily, has been used with success in diabetes insipidus.—C. E. de M. Sajous, Pr., July '24,65.

The preparation of a solid **Tartrate Principle** of Pituitary infundibular substance, with an action on the isolated uterus from 1,000 to 1,250 times more powerful than Histamine-acid-phosphate.—J. J. Abel and co-workers, Jl. Ph. and Exp. Ther., Vol. XXII./23,289. Its antidiabetic action in diabetes insipidus.—*ibid.* 317.

Pituitary Extract by the mouth in a case of diabetes insipidus proved quite useless to control diuresis, even when dried gland corresponding to 2 Gm. of fresh gland was administered daily in Salol-coated pills.—O. Leyton, B.M.J. i./26,303.

Posterior Lobe Extract 1 Cc. subcutaneously of value in diabetes insipidus.—P. Carnot and M. Peron, Paris Med., Oct. 24, '25,339, per Pres., May '26,202.

Intranasal administration of 1 Cc. liquid extract applied with a spray (also by insufflation of powder) successful in many cases of diabetes insipidus.—per B.M.J.E. ii./28,82 ; also *ibid.* i./29,21.

Galactagogue action.—The effect on the Mammary Gland is too transient to admit of therapeutic use.—Pres., May '31.

HÆMOPTYSIS : Pituitrin, ½ to 1 Cc. intramuscularly, the best immediate remedy.—W. H. Wynn, per Clin. Jl., Jan. 24/23,47.

Bleeding stopped in a case of hæmophila after one local application and one subcutaneous injection.—Pres., May '24,213.

HÆMORRHAGE, POST-PARTUM. Probably safe in the third stage of labour, and in the induction of labour, if used cautiously. Rarely safe in the first stage, and rarely, if ever, in the second stage.—A. M. Mendenhall, Jl. A.M.A. i./29,1346.

Heart failure successfully treated. Immediate effect required which could not be obtained from digitalis, strophanthus, etc.—L. i./15,289.

As a temporary cardiac stimulant in acute diseases, such as pneumonia, Pituitrin has been found successful, when Strychnine and Camphor have failed.—G. R. Murray, Clin. Jl., Aug. 1/23,364.

Labour. Useful in full-time pregnancies as a means of inducing strong labour pains, especially where pains have already set in, but have become weak or ceased—½ Cc. in the late first stage acts like a charm. A quick labour often occurs after it.—B.M.J. i./14,906,1046 ; B.M.J. ii./16,781. It is of little use in cases of abortion, having little effect in the early months Appears to act best in the latter part of the second stage.—L. ii./12,544. B.M.J. i./19,432.

0·5 Cc. every ½ hour with Chloroform anæsthesia. Partial anæsthesia maintained and uterus kept active.—A. F. Martin, B.M.J. ii./22,672.

It is important to see that clots as well as placenta are quickly removed. Give Liquid Extract of Ergot 1 drachm immediately after delivery of placenta, and 2 grain Ergotin Pills at 4 hour intervals.—R. Rolfe, B.M.J. i./19,728.

Its use during labour.—W. Blair Bell, B.M.J. i./25,1027.

The action of Pituitary Extract on the uterus.—L. ii./26,343.

The dangers of use in obstetrics.—M. Pierce Rucker, Jl. A.M.A. ii./25,163

Intravenous injection in the third stage of labour. The interval betwee the birth of the fœtus and the passage of the placenta was reduced by on half and the loss of blood was also diminished by almost one-half in injecte patients.—per Pres., May '27,193.

When Pituitary is used to *induce* labour it should not be repeated once pai are established, otherwise great danger is incurred.—W. A. Scott, Am. J Obst., Oct. '26; per Pres., May '28,180.

A dose of 2 units, if given before *os* is half dilated, hastens course of sluggis labour and is safe in any stage, providing there is no mechanical obstructio Ampoules containing only 2 units should be available, as this dose appea safe at any stage.—A. W. Bourne, and J. H. Burn per B.M.J. i./28,273 P.J. i./28,125.

Investigation *re* dosage of Pituitary in labour.—J. H Burn, P.J. i./27,13

Good results claimed by giving a tablespoonful of Castor Oil in the mornin and injecting 2 drops Pituitary Extract solution hourly throughout the da By this procedure labour is stated usually to terminate in 18 hours. Pr longed administration causes arterial degeneration.

Nasal Method of administration safe and efficient for accelerating labo already in progress. Insert a pledget of cotton wool moistened with 20 minin Pituitary Extract under the anterior end of the inferior turbinate of or nostril, withdraw after an hour or two and, if necessary, apply a fresh pledg to the opposite nostril.—Hofbauer and Hobiner (Baltimore); per Pres., Ma '28,180.

MIGRAINE well treated by 0·5 Cc. intramuscularly once weekly—prolonge improvement.—B.M.J.E. i./28,92.

POLYURIA reduced by the pituitary extract increasing the capacity of th kidneys to secrete a concentrated urine. Effect useful in diabetes but tran sient, lasting for a few days only.—B.M.J. ii./16,298.

Enuresis in children well treated with injections of Pituitary Extract.— per Jl. A.M.A. ii./25,1434.

Intravenous administration of Pituitary Extract produces a definite diures in anæsthetised animals. Injected subcutaneously it controls a diures produced by intravenous administration of 120 Cc. Ringer's Solution, injecte at the rate of 4 Cc. per minute, but if injected at the rate of 12 Cc. per minu no anti-diuretic effect occurs.—Qrtly. Jl. Exper. Physiol., May '25,119, p Jl. A.M.A. ii./25,932.

In the unanæsthetised animal subcutaneous injections of Pituitary ma inhibit diuresis for 4 or 5 hours. This can be overcome by oral administra tion of 1·5% Sodium Chloride solution.—A. McFarlane, Jl. Ph. and Ex Ther., Aug. '26,206.

SERUM SHOCK AND SERUM SICKNESS well treated with Pituitary Extra or Adrenalin Solution 1 Cc.—W. M. Crofton, Pres., June '23,235.

Oxytocin. *Syn.* ***Pitocin** (T.M. 496396) and ***Vasopressi** (T.M. 490452). *Syn.* ***Pitressin** (T.M. 496398).

Sir H. H. Dale and others have shown that the actions on the *bloo pressure* and on the *uterus* are due to *different substances.*

Separation of the oxytocic and pressor principles of the posterior lob (termed α and β Hypophamine respectively) as stable water-soluble powde B.C.A.,— '28,A554. See also H. W. Dudley, Jl. Pharmacol, '23,21,10 P.J. ii./26,115.

Uses.—Oxytocin possesses the stimulant action of Pituitary whereas Vasopressin has no such effect, even in large doses. Oxytoci may safely be used in labour by those who have refrained from usin Pituitary Extract, because of the danger of 'Pituitary shock' It has the same action as Pituitary Extract, but is without any o its vasometer effects.—A. W. Bourne and J. H. Burn, L. ii./28,69

Each Cc. of 'Pitocin' contains 10 oxytocic units, and it is thus identica in activity with 'Pituitrin.' *Dose.*—5 to 15 minims (0·3 to 1 Cc.) intra muscularly. If used before delivery is completed; small doses are use repeated if necessary in 20 to 30 minutes.

'Pitressin' is used for the treatment and prevention of surgical shoc

for the control of diabetes insipidus, and in cases of post-operative intestinal distension. Each Cc. contains 20 pressor units (one pressor unit being the pressor activity exhibited by 0·5 mgr. Standard Powdered Pituitary, U.S.P.) 'Pitressin' has thus double the pressor activity of 'Pituitrin.'

The action of the post-Pituitary principles (Oxytocin and Vasopressin) on the blood.—F. R. Curtis and J. W. Pickering, L. ii./28,695.

Oxytocin has no anti-diuretic activity. Vasopressin (but not Oxytocin) possesses the power of Pituitary extract of inhibiting the hypoglycæmic effect of Insulin. Oxytocin intravenously after hæmorrhage produces increased coagulability.—Kamm (Detroit), per Pres., May '29,183–186.

Phyone ($\phi\upsilon\omega$, I cause to grow).

The name given to the growth-promoting substance from the *pars glandularis* of the hypophysis. A method of preparing a potent, non-irritating Phyone extract suitable for clinical use.—H. B. Van Dyke and Z. Wallen-Lawrence, Jl. Pharm. and Exp. Therap., Dec. '30,413.

A fourth hormone, thyreotropic in nature, in the anterior pituitary.—F. A. E Crew and B. P. Wiesner, B.M.J. i./30,777.

Three independent principles in Pituitary.—J. H. Burn, M.R.C. Ann. Rept. 1928–29, B.M.J. i./30,560.

Placental Hormones.

The human placenta contains at least three hormones (1) the sex hormone **Oestrin** (now known as **Theelin**), obtained by extraction with Ether of an acidified aqueous extract, or of Alcohol-soluble fractions from the latter; (2) an œstrogenic hormone, suggested name **Emmenin**, an 85% Alcohol-soluble material present in the original extract, but with the Oestrin removed; (3) the anterior-pituitary-like substance precipitated from the original extract by Alcohol. These are alike in their œstrogenic effect on the immature female rat, the second factor being very similar to Oestrin in physiological effects, but ineffective in the castrate and presumably functions by stimulation of the intact ovary: it is not so effective orally as Oestrin. The third fraction differs from Emmenin in being ineffective orally, producing corpora lutea in the immature rat coincident with induced œstrus, causing increase of rate of growth of accessory sex glands in the immature male. Of the three, only Oestrin is obtainable from pig and cow placenta, suggesting that in the human placenta hormones exist absent in lower mammalian forms. These three principles are the specific products of placental tissue functioning and are actively related to the condition of pregnancy.—J. B. Collip, Ann. Meeting, B.M.A. Can., 1930, B.M.J. ii./30,1080; L. ii./30, 697.

Emmenin. *Dose.*—In dysmenorrhœa, which it has relieved, the equivalent of 25 Gm. placenta daily for 17 days, beginning with cessation of menstrual period, increasing during week preceding menstruation to 75 Gm. daily, continued till onset of flow and then stopped for a week.

Emmenin does not alter normal menstrual cycles, has encouraging effect in dysmenorrhœa, corrects amenorrhœa of recent origin, definitely lengthens cycles in polymenorrhœa, relieves menopausal symptoms of recent origin but not in castrates.

The Anterior-Pituitary-like principle. *Dose.*—1½ to 2 Cc.=25 Gm. placenta subcutaneously.

Arrests certain forms of metrorrhagia.—A. D. Campbell and J. B. Collip, B.M.J. ii./30,1083.; L. ii./30,697.

Serum, Horse, Normal.—*Syn.* **Antilytic Serum.** HORSE PLASMA (LIQUID) is supplied in 10 and 25 Cc. vials. *Dose.*—1 to 2 drachms. Employed locally, internally and subcutaneously. In the case

of old wounds and ulcers, an antitryptic substance in it may prevent the destruction of newly-formed epithelium by the proteolytic ferments contained in pus.

✱**Antilusin** (T.M. 310899) '**A**' for use *per os* and **Antilusin** '**B**' for local application, are preparations of this kind.

Hæmophilia, purpura and pernicious anæmia have been treated with it also as a food in tuberculosis and in typhoid.

(**Byno-plasma** contains 1 drachm sheep's plasma in every ½ ounce)

A dose of tuberculin in 10 Cc. of NORMAL HORSE SERUM is less likely to cause the rise of temperature than the same dose in 10 Cc. of Saline.

Chronic Gastric and Duodenal Ulcer Treated..—The serum is given by the mouth 3 or 4 times daily directly after food in ½ ounce of water. 60 or 80 Cc. may be given in 24 hours. The serum must be fresh—if it does not produce a good reaction in 24 to 36 hours it is useless for the purpose.

Hypersensitiveness to horse serum—5 Cc. caused death.—F. B. Gurd and E. Emrys-Roberts, L. i./20,763.

Burns well treated with Normal Horse Serum. First bathe the part in warm Normal Saline, remove devitalised tissue, spray with serum, containing 0·35% Cresol, and cover with rubber tissue. Good end-results without scar —S. R. Monteith and R. O. Clock, Jl. A.M.A., i./29,1176.

Coagulose..—A dried serum containing the fibrin ferment required to coagulate blood—used in hæmorrhage hypodermically after re-dissolving.

Haemostatic Serum. *Syn.* **Haemoplastin.** *Dose.*—1 to 2 Cc. injected intravenously or subcutaneously and repeated every 4 to 6 hours until hæmorrhage controlled. A serum derivative stated to promote clotting of the blood.

Coagulant hæmostatics should be applied locally at body temperature and the wound should not be allowed to cool; keep if possible at 37·5° C. Application of hæmostatics by continuous irrigation is inadvisable. Coagulen, thromboplastin, cephalin, protagulin, hæmoplastin and fibrogen amongst those reported upon.—J. W. Pickering and A. Hemingway, B.M.J. i./26,1025.

In a severe case, hæmoptysis arrested by intrapulmonary injection of Coagulen.—A. J. Morland, L. i./25,1238,1257.

✱**Coagulen-Ciba** (T.M. 372474).—Successful use in a case of typhoid with intestinal hæmorrhage.—L. C. D. Irvine, L. ii./25,918.

In two cases of hæmoptysis and one of hæmorrhage Coagulin-Ciba 5 Gm. in 200 Cc. water was given with good results in ounce doses every two hours. —R. W. G. Stewart, Jl. R.N.M.S., Jan. '26,64.

Snake Venom. *Syn.* VENENE.

'Crotalin' from the rattle snake was first used for the treatment of epilepsy in America. In S. Africa the mixed venoms of cobras and puff adders were tried by Russell—S. African Med. Record 1922, Vol. 20, p. 209.—Lieut.-Col. King, I.M.S.

The Medical Association of S. Africa declined a paper by Mr. FitzSimons on the treatment of epilepsy by snake venom, and the Editor of the Medical Journal of S. Africa refused to publish same on the grounds that there was nothing new in the treatment, and that it could no more be called a 'cure' for epilepsy than common salt is a cure.—B.M.J. i./29,34.

The preparation has been widely used for epilepsy in South Africa, and Mr. FitzSimons in a paper read before a combined meeting of the British and South African Associations for the Advancement of Science in July, 1924, reported encouraging results. There seems to be a prima-facie case for investigation of the claims. The benefits claimed may be due to desensitisation. —L. ii./30,915.

Spleen Substance Desiccated.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.) 1 part represents 5 of the fresh spleen. Has been used in anæmia, tuberculosis, myxœdema, etc. Value in typhoid and malaria possibly due to splenic hormones.

Extract of pig's spleen stated to give 100% of recoveries in tuberculosis of first degree and 75% in all—several hundred cases treated since 1907. One or two injections of 5 Cc. intramuscularly (thigh), or subcutaneously (abdomen) daily for adults. Oral route (in syrup) for prophylaxis, or adjuvant to injections; 4 tablespoonfuls given daily with meals to adults, representing

25 Gm. spleen tissue. Dose injected, or *per os*, proportionally less for children. Treatment absolutely harmless.—Bayle, Presse Med., Sept. 23, '25, per Jl. A.M.A. ii./25,1434. Pres., May '26,227.

Calcium metabolism stimulated by spleen, preparing suitable Calcium Salts for the blood stream and body cells. Splenic and parathyroid extracts suggested for treatment of pulmonary tuberculosis.—per Pres., May '26,227.

✱**Splenex** (T.M.499914).—A liquid extract of Spleen Substance (4 ounces = 2½ lbs. raw spleen), sweetened and flavoured. *Dose.*—½ to 1 tablespoonful daily for 3 weeks, with a week's interval between courses.—Pres., Apl., '29,147,257.

✱**Hormonal** (T.M. 330346). *Dose.*—15 to 20 Cc.—less for children.

Said to be a solution of the Hormone of the spleen to which peristaltic action is due. *Two forms* are made—*for intramuscular injection* and *for intravenous use.* Castor Oil (1 ounce) is to be given simultaneously with the intramuscular injections. The intramuscular dose produces, on injection in equal quantities into the right and left gluteal muscles, an effective evacuation. For use in chronic constipation and acute intestinal paralysis. Effects said to be lasting. 20 Cc. Ampoules are prepared, has also been given *per os.*

Two cases benefited by a single injection. Effect difficult to understand.—O. Leyton, B.M.J. i./15,246.

L. Levi quotes many authorities, mostly French and German, to show that Splenic Extract is useful in malaria, typhoid, tuberculosis, in hæmorrhagic conditions such as menorrhagia, and in anæmia.—per Pres., Oct. 23, 341.

Stomach Desiccated. *Syn.* ✱**Extomak** (T.M. 511536), **Ventriculin, Gaster Siccata,** ✱ **Byno-Eugastrol** (T.M. 516043).

Dose.—½ to 1 ounce (**15 to 30 Gm.**) *per diem* in water = approx. 200 Gm. fresh material.

Pernicious anæmia. Following on the demonstration by Castle (B.M.J. i./29,1120) that the stomach normally secretes a substance which can extract a blood-maturing principle from meat, E. A. Sharpe concluded that the feeding of stomach should have the same effect in pernicious anæmia as liver.

Whole desiccated hog stomach (30 Gm.=190 Gm. fresh tissue), and hog stomach defatted with Petroleum Benzine (30 Gm.=218 Gm. fresh tissue) produces satisfactory hæmatopoietic remission. The preparation has little odour and practically no taste. 15 to 30 Gm. equal in effect to 300 Gm. to 600 Gm. fresh liver.—E. A. Sharpe, Jl. A.M.A. ii./29,749.

Mucous membrane and muscular layer of hogs' stomach effective. Slightly better than liver therapy. Symptoms such as glossitis and paræsthesia show more ready response. The effect on the reticulated erythrocyte and mature erythrocyte counts and general symptoms good.—Sturgis and co-workers, Jl. A.M.A. ii./29,93: J. Wilkinson, B.M.J. i./30,236; A. Renshaw, i./30,334; Castle and Lock, i./29,1120. Resumé.—B.M.J. ii./30,437.

15 to 30 Gm. daily gave increase in red blood cells as great, or greater than, with liver.—Sturgis and Isaacs, B.M.J.E. ii./29,100.

A patient on liver treatment had a severe relapse and recovered under Ventriculin.—A. Renshaw, B.M.J. i./30,334. See also C. E. Stokes, B.M.J. ii./30,582, and G. T. Allerton, L. ii./30,795.

✱**Byno Eugastrol** (T.M. 516043). A concentrated extract of hog stomach.—B.M.J.i./31,589.

1 ounce daily of service at commencement, afterwards decreased to maintain an erythrocyte count of 5 millions.—W. Brockbank, Pr., Oct., '31,449.

*Extomak (Benger), (T.M. 511536). *Dose.*—25 to 30 Gm (weighed) daily in three portions. A light-coloured powder. 2 Gm.=100 Gm. fresh whole stomach. Should be mixed fresh with milk, otherwise a junket-like mass is produced. Undoubtedly better than liver. Erythrocytes and hæmoglobin increased 157% and 94% respectively, compared with 90% and 77% respectively with liver. Hydrochloric Acid and Pepsin do not appear to be necessary for relief of symptoms.—J. F. Wilkinson, B.M.J. i./31,85. See also C. S. Don and C. E. Jenkins, *ibid.*, 158.

Hog stomach better than ox or sheep. Interesting account of long treatment of a case with large amounts. Normal initial dose in a severe case need not exceed 1 to 1½ ounces daily.—J. F. Wilkinson, B.M.J. i./31,585.

Suprarenal Gland.

An average sheep's gland weighs about 2 Gm. (30 grains).

The glands are situated at the top of each kidney.

The fresh gland was first given to relieve Addison's disease, then dried preparations were used, also liquid extracts, and lastly an active principle, Adrenalin, which, in the form of its hydrochloride is now used both internally and externally. The compound is however thought to be destroyed by the stomach, but Hale White says gastric contents have no effect on it and he attributes absence of efficacy *per os* on the mucous membrane of the stomach and intestines to dilution, and adds that it is not absorbed by these.

Preparations of Adrenalin cause contraction of small blood vessels when applied locally, blanching the skin or mucous membrane. Locally there is an astringent action, and capillary bleeding, epistaxis and menorrhagia are checked; useful for bleeding after tooth extraction, and of value applied to the nostrils for hay fever and coryza. It is applied by the surgeon to check bleeding and blanch the parts for operations on the eye, ear, nose, throat and larynx.

Adrenal Glands are a source of power. They control the sympathetic system, and thereby dominate the 'fight' and 'flight' reactions.—H. Crichton Miller, B.M.J. ii./22,553.

See also abstracts under 'Pituitary' and 'Thyroid.'

The active principles of the Thyroid and Suprarenal Gland are supplemented by the supply of Oxygen—diminution of same has a very definite effect on the central nervous system. Asphyxia brings about an accelerated secretion of Epinephrin, chiefly due to lack of Oxygen. On the other hand the balance of CO_2 cannot be ignored. Its excessive removal from the blood brings about prompt and dangerous fall in blood pressure, due to depression of the vaso-motor centres of the bulb and spinal cord.—Prof. J. C. Meakins, L. ii./22, 230.

Uses.—The gland is really only effective when its preparations are injected or when they can reach the actual bleeding surface—hence will stop hæmatemesis, but not hæmoptysis; it may also be given to relieve syncope from chloroform. Its use has been suggested in Graves' disease and Addison's disease. *For further details see Adrenalin.*

Raw Adrenal gland of value in post-influenzal debility—1/6 gland thrice daily on an empty stomach. Also of value in preventing attacks of asthma.—L. J. Picton, B.M.J. i./27,641.

Suprarenal Gland, Dry.

Dose.—½ to 3 grains, three times a day.

Tablets, Compressed, each equivalent to ½ and 1 grain of **Dry Gland Substance,** are prepared.

Suprarenalum Siccum. U.S. IX. *Average dose.*—4 grains. Suprarenal glands of animals which are used for food by man, freed from fat, cleaned, dried and powdered. Contains 0·4 to 0·6% epinephrine and if assayed biologically 1 Gm. contains the equivalent of 10 mgr. lævo-methylamino-ethanol-catechol (adrenalin). Ash limit, 7%.

In practice we find an average sheep's gland weighing 30 grains yields 5 grains of dry powder.

ADDISON'S DISEASE.—O. Leyton, B.M.J. i./15,245, says it needs 20 to 30 grains thrice daily continued indefinitely.

Addison's disease treated by 1 drachm dried 'extract' of whole suprarenal (Armour) thrice daily. Patient collapsed and died.—T. Thompson, L. ii./30, 786.

Insignificant therapeutic value.—Hoskins and Sleeper—Pres. May, '31,185.

G. R. Murray states that he has never seen permanent improvement in Addison's disease as a result of treatment with Suprarenal Gland.—Clin. Jl., Aug. 1/23,363.

Exophthalmic Goitre.—Suprarenal gland eulogised.—L. ii./12,216. See also Hector Mackenzie, L. ii./16,815.

Suprarenal Snuff.

Dry Suprarenal Gland 1, Menthol 2, Ammonium Chloride 6, Boric Acid 4, Lycopodium 4, for use in hay fever.

Insufflation Powders for hay fever, of the following formulæ, have been suggested :—

(1) Adrenalin 1, Zinc Stearate 100, Heavy Magnesium Carbonate 900.
(2) Adrenalin 1, Zinc Oxide 100, Bismuth Subcarbonate 400.
(3) Suprarenal Gland Substance 1, Zinc Stearate 20, Zinc Oxide 80.

Tabellæ, Chocolate, contain ½ grain of dry substance equivalent to 4 grains of fresh gland, and are agreeable for internal use.

Liquid Extract of Suprarenal Glands.

Dose.—10 to 15 minims (**0·6 to 1·6 Cc**). *Hypodermically,* 1 to 5 minims as such or diluted with normal saline.

Prepared with glycerin, strength 1=1 of fresh gland. It was with this preparation that all the early valuable results were obtained. For local application rarely used stronger than 10%.

Suppositories contain 3 minims of Liquid Extract in 15 grains of Gelatin basis; to check bleeding piles.

℞ ℙ **Suppositories, Suprarenal with Morphine.**—These contain ¼ grain of Morphine Hydrochloride in addition.

Suprarenal Ointment.—Liquid Extract of Suprarenal Gland 50 minims, Liquid Paraffin 2 drachms, Hydrous Wool Fat to 1 ounce. It may be scented with Otto of Rose.

Nebula Extracti Suprarenalis.—Contains 5% of Liquid Extract. For use as spray in hay fever and coryza.

Adrenalin. *B.P.* '14. (ADRENALINUM). P. BELG., FR. CX. PH. NED. V., P. ITAL. V. *Syn.* **Adrenine, ✱ Hemisine** (T.M. 250250), **✱ Renaglandin** (T.M. 480619), **Suprarenin, Takamina** F.E. VIII., **Adnephrin, Paranephrin, ✱ Vaso-Constrictine** (T.M. 288888), **✱ Vasotonin** (T.M. 326554). **Levoreninum Lévorénine,** P. BELG. IV. **Epinephrina,** U.S. X. Latter gives average Hypodermic dose 0·0005 Gm. (1/120 grain).

The empirical formula usually given is $C_9H_{13}NO_3$=183·112, *i.e.* $(OH)_2.C_6H_3.CH(OH).CH_2.NH.CH_3$.

It is an active principle of the Suprarenal gland, light brown powder or in grey crystals (first prepared by Takamine). It appears to maintain a proper degree of contraction of the arteries and hence to correct blood pressure.

U.S.P. X. assays biologically, comparing rise in systolic blood pressure of the dog after intravenous injection with that produced by a standard extract.

Colorimetric Assay.—Ammonium Molybdate colours with Adrenalin (as it contains a Catechol group). As standard, Adrenalin or Tannin can be used. Reducing substances, *e.g.*, Ferrous Salts, Alcohol, Bisulphites, should be absent. —J. Rae, P.J. ii./30,451.

Soluble slightly in hot water, also more readily in Hydrochloric Acid, and Boric Acid Solution forming corresponding salts. From concentrated solutions it is precipitated by alkali. Aqueous solutions of its salts are lævorotatory.

Insoluble in alcohol, ether, chloroform, petroleum ether and other organic solvents. Oleic acid is a poor solvent. Not precipitated by ordinary alkaloidal reagents. It is chemically a powerful reducing agent.

On heating above its melting point (263° C.) it decomposes with an odour resembling opium smoke.—FR. CX. *B.P.*, 1914, states M.Pt. 205 to 212° C. with partial decomposition. We found commercial Adrenalin to darken at 194° C. and melt at 204° C.

Prescribing note.—It is best prescribed *alone* in Solution (*post*) as it oxidises rapidly, especially in neutral or alkaline solution.

Manufacture.—The suprarenal glands are reduced to pulp and macerated, excluding oxygen as much as possible, in warm (50° to 80° C.) water or very dilute acid for 5 hours, the mixture being then heated at 90° to 95° C. to coagulate albuminoids. This aqueous extractive is evaporated and extracted with alcohol. Precipitation from this liquid of impure Adrenalin follows by means of ammonia. It is purified by ether-alcohol, and re-precipitation with ammonia or fixed alkali.

Suprarenin P.G. VI.—Ortho - Dihydroxyphenylmethylaminomethylcarbinol. *Syn.* Ortho-dioxyphenylethanolmethylamine is synthetic Adrenalin with allied properties. Lævorotatory.

Natural lævogyrate Adrenalin possesses a vaso-constrictive action which is more than double that of the racemic (synthetic) product, the exact relationship being, 1=0·46, and from this may be inferred the dangers attending the use of a product not possessing the full activity of the official substance. —Tiffeneau, C. D., May 28/21, p. 708.

r-Adrenalin in small doses of order of 0·01 mgm. increases the blood pressure to a somewhat less degree than l-Adrenalin, the difference in activity in general is about 10–15% but may be 25–30%. As dose is increased to 0·05 mgm. this difference becomes less apparent and with the usual therapeutic dose of 0·04 to 0·1 mgm., there is no disadvantage in the use of the synthetic racemic compound.—J.C.S.A., i./22,891.

Suprarenin synthetic identical in all respects with adrenalin is available.—B.M.J. ii./26,168.

History of Adrenalin.—H. A. D. Jowett, P.J., ii./26,116.

Synthetic Adrenalin usually corresponds to the active natural lævo form, but some preparations appear to be the cheaper racemic form and therefore much less efficient, since dextro-Adrenalin is about 15 times less active than the lævo compound.—C.D., May, 10/24,678.

Synthesis of Adrenalin.—P.J. ii./29,289.

Substances possessing an Adrenalin-like action have also been found in putrefying meat, *vide* **Hydroxyphenylethylamine.**

Liquor Adrenalini Hydrochloricus. Adrenalin Chloride Solution. *Dose.*—10 to 30 minims (**0.6 to 1.8 Cc.**) by the mouth.

Adrenalin 1, Chloroform 5, Sodium Chloride 9, Dilute Hydrochloric Acid 3, Distilled Water, freshly boiled and cooled to 1,000.

The original preparation contains 1 of Adrenalin Chloride in 1,000 of Normal Saline Solution, with 0·5% of Chloretone, as in F.E. VIII. and P. Belg. IV.

Hypodermically, ½ to 1 Cc. injections of the 1 in 1,000 Solution are given or it may be diluted with Normal Saline Solution 10 times (or less). Dilutions may be prepared freshly as required.

Liquor Epinephrinæ Hydrochloridi. U.S. X. is the same strength Assayed biologically. *Average dose.*—0·5 Cc. hypodermically.

Decoloration of Solutions.—It is best prescribed alone. The solution is liable to turn brown on exposure. Oxidising agents produce this effect, *e.g.*, Hydrogen Peroxide on neutralising. Loss of activity is proportional to this coloration.

In some experiments which we conducted we found that a small quantity of formalin added retards the coloration of Adrenalin solution, as also does Sodium Hyposulphite.

Uses.—Locally applied, it is of great value in arresting local hæmorrhage, the part becoming blanched—hence its use in superficial wounds and abrasions, in tooth extraction and nose bleeding and during operation to stop capillary hæmorrhage. Applied locally the vascular constriction lasts ½ to 2 hours. Solutions are useful in coryza, hay fever and asthma. It may be given by the mouth to check hæmorrhage from the stomach or injected into the rectum, bladder and uterus for bleeding. It reduces the swelling in giant urticaria. It is of no value in hæmoptysis; of little use in remote hæmorrhage however given, in fact the rise in blood pressure may increase the hæmorrhage. Hypodermically, it does not materially raise the blood pressure, as the local vascular constriction prevents absorption. Intravenously it is successful in surgical shock, circulatory failure and asthma.—Mitchell Bruce.

Action on the Heart. According to the makers of the body, ***injections*** of it are followed at first by an acceleration in the pulse rate and a simultaneous contraction of the muscular coat of the peripheral arteries. This causes an immediate rise in blood pressure and excites the cerebral vagus centre, which in turn slows the heart beat and strengthens the cardiac contractions. Apart from this indirect vagus action, adrenaiin stimulates the heart directly. Excessive doses over-stimulate the cardiac muscles and predispose the heart to fibrillary contractions. ***Given per os*** in small doses it does not increase blood pressure unless there is suprarenal insufficiency,

on the contrary 3 to 5 drops in a little acidulated water ***may be given to reduce hyperpiesis.***

In nose operations, submucous injection of 10 minims of 1 in 10,000 solution with 5 minims of 1% Cocaine Hydrochloride is utilised to lessen blood flow.

ASTHMA.—1 to 5 minims hypodermically gives prompt relief. Continued daily use has no harmful effect.—G. R. Murray, Clin. Jl., Aug. 1/23,363.

Many cases get relief from an injection.—T. Drummond, B.M.J. i/23,320.

In status asthmaticus the continuous injection of Adrenalin in small quantities, up to even a drachm in ½ hour, the only cure.—A. F. Hurst, B.M.J. ii./29 297.

(**Evatmine** contains Adrenalin and Pituitary.)

COLLAPSE has been treated by 0·5 to 1 Cc. injections every 1 to 2 hours *Intravenous injections* of Saline (*q.v.*) with 6 to 8 drops of the Solution to the litre, are practised, also in chloroform syncope and other forms of heart failure

PERTUSSIS.—Children have taken 1 to 3 drops *per os* or less, according to age every 3 or 4 hours with good effect.

INTRACTABLE HICCOUGH.—In a fit of violent and painful hiccough, lavage with Silver Nitrate, and general anæsthesia under Chloroform were equally unsuccessful,—finally two doses of 10 drops of Adrenalin Solution caused it to cease.—P.J. ii./13,808 ; C.D., Jan. 10,'14.

GASTRIC ULCER.—Probably the best drug to control hæmorrhage. To raise blood pressure in shock and in pneumonia repeated small doses—1 Cc. of 1 in 1,000 every hour required.—O. Leyton, B.M.J. i./15,245.

Adrenalin should not be injected in Chloroform anæsthesia.

STOKES-ADAMS ATTACKS well treated with Adrenalin Solution (5 m. doses) subcutaneously.—A. G. Phear and J. Parkinson, L. i./22,933.

POST-ANÆSTHETIC VOMITING checked by 5 to 8 minims Adrenalin Chloride Solution *per os*.—V. Macdonald, per Pres., Jan. '23,5.

VOMITING IN MALARIA well treated with 7 to 8 minims—one dose sufficient.—E. Lomax Wood, per Jl. Trop. Med., Aug. 1/22,248.

VERTIGO.—A lasting cure was obtained by giving 20 drops *per os* a day.—per Pr., Sept. 23/232.

FRACTURES treated by Adrenalin solution 10 drops and Calcium Phosphate o·1 Gm., twice daily, in addition to usual treatment.—Pres., May '24,206.

ALOPECIA.—following a history of scarlet fever, fright and malaria—well treated by injection and dried thyroid *per os*.—Pres., May '24,207.

GAS GANGRENE.—Epinephrin, 0·5 Cc., injected in vein at elbow, saved a case apparently moribund.—per Jl. A.M.A. ii./25,1435.

GIANT URTICARIA or Quincke's œdema specifically treated by Adrenalin Hydrochloride, 2 m. of the 1 in 1,000 solution intramuscularly daily for 4 or 5 days, followed by Suprarenalin 1 gr. and Dry Thyroid ¼ gr. twice a day on an empty stomach for three weeks.—H. W. Acton, I.M.G., May '25,200.

Urticarial eruption successfully treated by 10 minims Adrenalin hypodermically.—J. R. Keith, B.M.J. ii./25,1005.

PYLORIC STENOSIS.—Adrenalin intramuscularly in the forearm has decidedly beneficial effect. Given 10 minutes before feed in form of ¼ mg. doses of Suprarenin Hydrochloride in 1 in 1,000 solution from 3 to 5 times daily. Good results in some cases when combined with use of Atropine.—J. L. Meagher, B.M.J. i./26,89.

RHEUMATIC HEART BLOCK well treated with Adrenalin solution 4 m. hypodermically—a total of 32 m. in 5 days.—G. A. Sutherland—Pres., May '26,19

Adrenalin intravenously inhibits uterine contraction before delivery. The administration of Ether has a similar effect.—A. Bourne and J. H. Burn P.J. ii./27,490.

Adrenalin is rendered inactive within a few hours in contact with colloida and organic Silver compounds.—per Pres., May '27,188.

Adrenal Therapy—a review of literature.—Pres., May, '29,180.

Chemical factors in control of the circulation—Adrenalin Vasopressin Histamine, Acetyl-Chlorine.—H. H. Dale, L. i./29,1179, 1233,1285.

Adrenalin idiosyncrasy.—Some people show toxic effects with a small dose of Adrenalin, especially when given simultaneously with certain local anæsthetics, *e.g.*, Novocain. In dental practice this could be eliminated by avoiding use of solutions stronger than

1 : 100,000. Surgeons should avoid the use of Adrenalin by using a general anæsthetic, when it is found by a small preliminary injection that idiosyncrasy exists. Its use is contraindicated when operating on patients with Graves' disease.—H. E. Symes-Thompson, L. i./24,745.

Possible danger.—An anæmic boy of 15 had his nose packed with gauze soaked in 20% Cocaine Hydrochloride and 1 in 4,000 Adrenalin half an hour before operation for hypertrophied turbinates and adenoids. Patient collapsed under further injection of 5 minims of 1 in 1,000 solution. The symptoms may have resulted from anæmia of the bulb.—J. Allan, Pres., 1913.

Tetany following the use of Cocaine and Epinephrin (1 in 1,000) is of fairly frequent occurrence. It is not a drug intoxication but is due to a combination of hypoparathyroidism, hyperventilation, and Epinephrin in nervous patients. Quickly relieved by Parathyroid Extract subcutaneously.—S. E. Roberts, Jl. A.M.A., ii./29,906.

A lady gave herself 20 minims of the solution hypodermically for asthma and repeated it every two hours, with little relief for six doses. On arrival home she had administered 120 minims of undiluted solution. Her condition was alarming, she collapsed and her pulse was almost indistinguishable but improved quickly on use of Amyl Nitrite.—F. R. Sawdon, B.M.J. ii./22,866.

Intravenous injection of Adrenalin 40 times more dangerous than subcutaneous.—L. i./24,744.

With long use there is risk of arteriosclerosis.—B.M.J.E. i./26,16.

Intracardiac Injection in resuscitation. No drug known comparable with Adrenalin in efficacy to start an arrested heart or to antagonise the action of Chloroform. The power of Adrenalin. to antagonise a *muscular* paralysis, has not been sufficiently realised. For resuscitation in cardiac arrest artificial respiration should be resorted to first by the usual methods. If at the end of 3 or 4 minutes no pulse can be felt, and especially if no heart beats can be heard on auscultation, adrenalin should be injected into an external jugular vein. The abdomen should be opened high up, one hand inserted in the opening, passed up over the left lobe of the liver and the heart massaged intermittently.—J. A. Gunn, B.M.J. i./21,9. *See also* C. Walker, *ibid.*, 46 and J. P. Lockhart-Mummery, *ibid.* 100. (According to the last authority it was possible to revive a cat 20 minutes after all signs of life had ceased. In use it was found more effective to inject a 1 in 50,000 solution of Adrenalin intravenously than to inject into the heart.)

When used for resuscitation, it is necessary to temporarily establish an artificial circulation to carry the drug to the periphery. It acts on the peripheral vessels, chiefly the peripheral arterioles, hence the intravenous injection is necessary in 2 parts or more, and in dilution of about 1 in 50,000.—J. P. Lockhart Mummery, B.M.J. i./21,582.

Intracardiac (right ventricle) injection of 1 Cc. of Adrenalin solution. The patient was considered dead. Heart action had definitely stopped. A few seconds later there was commencement of the heart beat and 2½ hours afterwards the patient could walk a few steps.—C. Bodon, L. i./23,586.

In a case of anæsthetic syncope in which heart and respiration ceased for 10 minutes, 5 minims of a 1 : 1,000 solution injected gave immediate results—K. R. Hill, Clin. Jl., Feb. 28/23,104 ; *see also* J. G. Reed, B.M.J. i./24,820, and Jl. A.M.A. ii./25,1096.

Of 34 cases quoted in the literature of cessation of heart's action during anæsthesia treated by intracardiac injection of Adrenalin, 60% have survived. Useless after 5 minutes.—Pres., April '26,141 ; *see also* E. G. Stuart, L. ii./25, 1208.

Stillborn infants responded to Adrenalin by intracardiac injection.—M. G. Cardwell, B.M.J. ii./26,638.

Ventricular activity re-established in Stokes-Adams attacks by intracardiac injection of Adrenalin.—L. i./27,401.

A warning is issued against the incautious use of intracardiac injections in Chloroform syncope, since it enhances the already existing irritation of the parasympathetic. For the first injection no more than 4 minims of the 1 in 1,000 solution in warm saline should be used, repeated or increased to 8 minims later.—Presse Med., '26,84, per Pres., Feb. '27,65.

The injection might damage the myocardium.—Sir F. Shipway, but not considered likely by Prof. Gunn and Sir E. Sharpey Schafer.—L. ii./31, 797. Cardiac massage thought preferable.

Adrenol Solution.—A solution of the Adrenal active principle in oily solution. Suitable for spray with an oil atomiser. Dissolve Adrenalin 1 with Alcohol 7 and Hydrochloric Acid *q.s.* (0·2 of actual HCl = 0·6 of *B.P.* '14 Acid approximates theory : we find in practice a little more may be necessary), then add Absolute Alcohol *q.s.* to 12·5 and make up to 1,000 with Castor Oil. Eucalyptol 5 may be incorporated if desired.

Adrenalin Inhalant.—A preparation containing Adrenalin Chloride 1 in 1,000 made with aromatised Hydrocarbon Oil. Is soothing and astringent in inflammatory affections.

Dilutions for use. As spray the Adrenalin Chloride Solution in Normal Saline is diluted to 1 in 2,500, or even 1 in 5,000 parts is effective in the nostrils or within the uterus.

Adrenalin Tablets are made containing $\frac{1}{65}$ grain (0·001 Gm.) and $\frac{1}{200}$ grain (0·0003 Gm.).

℗ **Sterules, Hypodermic** of Cocaine Hydrochloride $\frac{1}{3}$ grain with Adrenalin $\frac{1}{1000}$ grain in 15 minims for dentists' use are prepared.

℗ **Tablets of Adrenalin** ($\frac{1}{300}$ grain), with Cocaine Hydrochloride ($\frac{1}{6}$ grain) are prepared for dental use. They will fit into cavities where pulp has to be extirpated, or may be dissolved in 15 to 30 minims of water forming a solution suitable for ordinary cases.

Sterules, Hypodermic of Adrenalin Chloride Solution (contain 10 and 15 minims) with elongated ends, which may be snapped off; these are a great convenience, particularly in dental work to check hæmorrhage after tooth extraction.

The 15 minim size are for use with the β-Eucaine Powders in **Infiltration Analgesia.**

℗ **Injectio Adrenalin Composita**—Vic. Park.
Adrenalin Hydrochloride Solution (1 in 1,000) 5 minims, Atropine Sulphate 1/200 grain, Strychnine Hydrochloride 1/100 grain, in 10 minims of Distilled Water.

Sterules, Ophthalmic of Adrenalin Chloride Solution are prepared. In these, the activity of the solution persists, in all probability for years, owing to their being hermetically sealed.

Styptic Gelatin.
Gelatin 1½ grains, Adrenalin Solution 15 minims, Water *q.s.* to 60 grains—this quantity for a dose ; contains Salicylic Acid 1 grain to the ounce to preserve. Suggested for internal hæmorrhage.

Suppositories, Hollow, of Cacao Butter are prepared, containing 10 minims of the Solution (15 and 30 grain size). As also 1 in 1,000 of the Adrenalin Chloride in the Theobroma mass. For hæmorrhoids.

℗ **Suppositories of Adrenalin, Cocaine, Hamamelis and Formidin** contain Cocaine Hydrochloride $\frac{3}{4}$ grain, Hamamelis Extract 3 grains and Formidin 3 grains. Germicidal, analgesic and tonic astringent. They may be made 15 grain size with 1 of Adrenalin in 1,000 of the basis.

Guttæ Adrenalin Cum Acido Borico R.O.H.
Adrenalin Solution 1 drachm, Boric Acid 10 grains, Sterile Water to 1 ounce.

Guttæ Adrenalin Cum Zinci Chlorido R.O.H.
Adrenalin Solution 1 drachm, Zinc Chloride 1 grain, Sterile Water to 1 ounce.

Guttæ Adrenalin Cum Zinci Sulphate R.O.H.
Adrenalin Solution 1 drachm, Zinc Sulphate $\frac{1}{2}$ to 2 grains, Boric Acid 10 grains, Sterile Water to 1 ounce.

Solutio Adrenalini Composita, St.Th.H.
Adrenalin Hydrochloride solution, 1 in 1,000, 5 minims, Atropine Sulphate 1/200 grain, Strychnine Hydrochloride 1/100 grain, Distilled Water to 10 minims.

Ⓟ🅱**Trochisci Adrenalin** contain each:—Adrenalin, $\frac{1}{1000}$ grain; Heroin, $\frac{1}{100}$ grain; Ipecacuanha, $\frac{1}{50}$ grain; Red Gum, 2 grains; Rose basis *q.s.* to 20 grains. These are astringent and sedative.

Unguentum Adrenalin. Adrenalin base 1, Lanolin Ointment 5,000, scented with Geranium Oil. Useful in the nostril in acute coryza and inflamed mucous surfaces.

In neuralgia, neuritis and reflex or referred pain, small quantities may be rubbed in with advantage.

🅱🅿**Adrenalin Catheter Lubricant.**—Adrenalin (base) 1, Cocaine 10 Atropine 10. Dissolve the Adrenalin in Hydrochloric Acid (*B.P.* '14,) *q.s.* (0·6 is usually sufficient) diluted with Absolute Alcohol 30. Dissolve the alkaloidal bases in Oleic Acid 20 and mix this and the Adrenalin Solution with sufficient Castor Oil and Absolute Alcohol in proportion of 4 to 1 to make 1,000 of the lubricant.

Isoamylamine and **para-hydroxyphenylethylamine** (*q.v.*) are pressor substances like Adrenalin found in putrid meat and Ergot. Unlike Ergot the pressor action is produced when taken by the mouth. The action, though less marked, is more prolonged than of Adrenalin.—W. E. Dixon & H. H. Dale, B.M.J. ii./09,540; *see also* our pp. 407, 408.

Iso-amylamine, and apparently the other amine, are present in normal urine, but absent, as shown by W. Bain (see L. i./28,389), from urine in most cases of high blood pressure. Their retention is thought by him to be the cause of hyperpiesis and is due probably to some renal defect. Palliative measures essential. As Iso-amylamine is derived from purtefactive nitrogenous material beef, mutton, etc., are to be avoided. Meat extracts should be absolutely prohibited. See also our pp. 407, 408.

Lævo-Glaucosan. A solution of synthetic lævo-rotatory and inactive suprarenin. For instillation treatment of glaucoma. The eye drops produce a burning sensation, hence it is stated Holocain Drops 1 to 2% should be used first. The preparation must not be injected in any manner (✱**Glaukosan** is T.M. 497779).

Neither Lævo-Glaucosan nor Amino-Glaucosan—*syn.* Histamine have any prolonged effect in lowering intraocular tension, and their action is neither uniform nor dramatic. The dilatation of the pupil by Lævo-Glaucosan is useful as a diagnostic as it does not raise tension; in secondary glaucoma it ruptures synechiæ. Amino-Glaucosan is an extremely potent myotic—occasionally a useful adjunct to Eserine. Both Lævo- and Amino-Glaucosan cause severe reaction and pain and are not without danger to the cornea.—W. S. Duke-Elder and F. W. Law, B.M.J. i./29,590.

Similar reports by American workers.—Pres., Nov. '29,386.

Suprarenal Cortex, Desiccated. (1=6 of fresh gland tissue.) *Dose.*—2 to 5 grains thrice daily.

This has been used experimentally on the grounds that the cortex has a function distinct from the medulla.

Function of Suprarenal Cortex.

Cortex and medulla are independent and antagonistic. The cortex is closely in association with internal secretion of the pancreas in carbohydrate metabolism and accelerates the external secretion of the pancreas into action. It is antagonistic to the thyroid. The parenchyma cells of the pituitary hypertrophy when the cortex is impaired, whether the medulla functions or not, but if the medulla is destroyed the eosinophil cells atrophy. The cortex is essential to life which can be maintained with ¼ of one cortex. Its secretion lowers blood pressure and does not coagulate blood. It is soluble in water or Alcohol, is neither protein nor fat, is antagonistic to Adrenalin and inhibits secretion of that substance by the medulla.—Tokumitsu, B.M.J. i./24,40.

ADDISON'S DISEASE has been proved to be due to destruction of the cortex only.

Several American workers claim to have isolated the cortical autacoid, which they have variously termed '*Cortin*' (Hartman, Brownell, Dean and MacArthur), '*Interrenin*' (Goldzieher), and '*Interrenalin*' (Rogoff and Stewart), and most recently *Swingle and Pfiffner's Extract infra.* By means of the last-named it is claimed that life may be maintained indefinitely in adrenalectomised animals.—All the preparations mentioned have given good results in Addison's disease.—Pres., May, '31,188.

Cortical Hormone (*Swingle and Pfiffner*), *Syn.* ✱**Eucortone** (T.M. 522708). *Dose.*—10 to 20 Cc. intravenously or subcutaneously in divided doses daily. As much as 20 Cc. have been given at one time. Addison's disease well treated. Thought to have an action in the crisis analogous with action of Insulin in diabetes.—L. Simpson, P.R.S.M. 11/12/30, Jl. A.M.A. Jan. 24, '31.

✱**Epinine.** (T.M. 320407). *Syn.*—3-4 DIHYDROXYPHENYLETHYLN METHYLAMINE. $(OH)_2.C_6H_3.CH_2.CH_2.NH.CH_3$=167·1094 was obtained by Pyman J.C.S. 96 (1910) 264, from 1-Keto-6-7 dimethoxy-2-Methyl-tetrahydro-isoquinoline by heating it with Hydrochloric Acid at 170 to 175° C.

It differs from Adrenalin by the absence of an aliphatic OH (*cf.* formula), It is supplied in 1% solution to be diluted with Normal Saline. It resembles Adrenalin in action, but the rise of blood pressure though not so intense is said to be more prolonged. For use in ophthalmic work 0·1% as a styptic to bleeding surfaces 0·1 to 1% hypodermically 1% and intramuscularly 0·1% solutions are used.

Testis.—The use of an extract from the testicles of animals was asserted to reanimate sexual power.

Liquor Testicularis, Orchic Fluid. *Syn.* ORCHIDIN, TESTICULIN. *Dose.*—15 to 30 minims hypodermically, or by the mouth.

Prepared from the testes of animals, by maceration with glycerin and subsequent filtration under pressure with carbonic acid.

℗ **Sterules** of **Testicular Extract** 10 minims, **Sodium Glycerophosphate** 2 grains and **Strychnine Hydrochloride** 1/50 grain are made. **Tablets of Didymin.** (Testicular substance), 5 grains.

STEINACH OPERATION.—22 cases. Contraindicated in advanced senility or seriously impaired cardio-vascular apparatus. The operation is harmless. It causes increased thyroid activity and stimulates other glands if dilinquent; increases activity of interstitial cells.—H. Benjamin, per Pres., Oct., 1923,357. J.A.M.A. says no instance of "rejuvenation" has been reported.—*Ibid.* 358.

Results of injection of Testis substance (ram's or goat's) in 650 patients. Neurasthenia, senility, loss of sexual appetite, melancholia, etc., were benefited

acne cleared up, asthma was relieved and tuberculous patients improved.—L. L. Stanley, *ibid*, 359.

Hypodermic injections of Orchitic Extract 1 Cc. twice weekly, for 6 to 9 doses, gave good results in cases of loss of virility and general weakness.—E. C. Plummer, Pr., Dec. '27,388.

Oral administration of a preparation of testes and adrenals in 70 tuberculous patients and 14 seniles indicated practically no efficacy.—V. Korenchevsky, L. ii./25,1056.

Testicular Extract is inactive.—J. H. Burn, C.D. ii./26,727.

Orally, administration absolutely useless. Of 15 grafting operations there had been some improvement in 30—40%. Advised in paralysis agitans, as 2 out of 5 cases showed marked benefit.—Kenneth Walker, L. i./25,740.

Funk and co-workers have prepared from human urine an active extract called *Androkinin*. Koch (Chicago) has also prepared an active testicular extract, but states that to produce in man effects on sex characters equivalent to those observed on capons the daily dose would need to represent 5 lbs. of bull's testes tissue or two gallons of normal urine (!).—Pres., May, '31,205.

⁂**Testogan** (T.M. 414020).—*Dose.*—A tablet three times daily after meals.
A preparation of the hormones of the reproductive glands and of the glands of internal secretion. Suggested for use in impotence.

⁂**Thelygan** (T.M. 414021).—*Dose.*—As for Testogan.
A preparation made on similar lines for women. Suggested for infantile sterility, undeveloped mammæ, frigidity, sexual disturbances in obesity and other metabolic disorders, climacteric symptoms, amenorrhœa, neurasthenia, hypochondria and dysmenorrhœa.

They are also made in ampoules for intragluteal injection.

Thymus Gland, Desiccated.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

One grain of this powder represents 5 grains of the fresh gland of the calf. Has been given to improve the defective nutrition in childhood, Graves' disease, hæmophilia, for anæmia, chlorosis and leucocythæmia, rheumatoid arthritis, and diabetes.

Tablets, 3 and 5 grains.

In infantile paralysis Thymus Gland is indicated. A child can take 15 to 20 grains in 24 hours.—W. MacKenzie, B.M.J. i./15,63.

Liquid Extract of Thymus Gland. 1=1.

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

General opinion to-day is against the inclusion of the thymus amongst the endocrine organs. Recent work shows that its extirpation produces no appreciable result and the evidence is favour of an endocrine function is no greater than that for any other lymphoid structure.—Pres., May, '31,207.

The absolute weight of the Thymus increases rapidly during the first two years of life, changing little till the seventh year, when it again increases, to fall slightly after the eleventh year. Heavier in the male at birth and for first four years of life, after which weight is approximately equal in the two sexes until eleventh year, when it tends to be absolutely heavier in the female.—A. B. Bratton, Jl. Path. & Bact. (Edin), Oct. '25, per Jl. A.M.A. ii./25,1996.

At the Middlesex Hospital all children up to 14 years must have thymic X-Ray examination before operative procedures are undertaken.—J. W. Fisher, Jl. Lab. & Clin. Med., per Pres., May '26,223.

No evidence that 'status thymico-lymphaticus' has any existence. We have to accept the fact that a few people, especially children, die for no apparent reason—such deaths cannot be attributed to the state of the thymus and the lymphatic glands.—Report of 'Status Lymphaticus' Committee, L. i./31,594.

Acidum Thyminicum *Syn.* ⁂**Solurol.** (T.M. 264148). Nucleotin-phosphoric acid. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**) after meals.

Approximate composition :—$C_{20}H_{35}N_3O_{16}P_3$ (Kossel)=635·351.

A product of the metabolism of the nucleins present in food containing nucleo-proteins, *e.g.*, thymus gland, pancreas, spleen, etc. It possesses affinity for, and solvent action on, Uric Acid, and is employed in the treatment of

gouty affections; 1 of the acid will dissolve 1·3 of Uric Acid at 100° F. *in vitro*. Has been given in 2 grain doses by **intramuscular injection** in severe gouty affections, especially neuritis.

Soluble with ease 1 in 5, stronger solutions may be prepared, but it is mostly prescribed as **Thyminic Acid Tablets**, 4 grains, and in Cachets.

Thyroid Gland.

This gland and preparations made from it, have been employed for relieving myxœdema, cretinism, lupus, psoriasis and chronic eczema. It is also used in obesity, menstrual disorders, neurasthenia, insanity, migraine and chronic rheumatic affections. The methods employed have been (1) by feeding with the glands; (2) by grafting (Victor Horsley); (3) by the exhibition of **Thyroid Solution** by the mouth or hypodermically; (4) by **Dry Thyroid** in powders, cachets or tablets. Success has been most notable in cases of myxœdema in which prolonged treatment is necessary; obese and insane persons and weak-minded children have also improved under its use.

The action, on administration of thyroid gland preparations, is (1) a stimulating one—metabolism is increased by a process of katalysis; and (2) the production, by means of the parathyroid tissue present when sheep's gland is used, of a substance which has the effect of neutralising the toxic results of this metabolism.

It should be noted that the Thyroid preparations on the market (mostly made from sheep's thyroids) are obtained from parathyroid as well as thyroid tissues; deficiencies, therefore, in both these glands in man are met by feeding with these preparations. Signs of thyroidism must be carefully watched for during administration of Thyroid preparations.

One lobe (½ gland) of the sheep's gland, we find, weighs on an average about 35 grains and yields about 9 grains of dry thyroid.

Thyroid gland treatment of myxœdema and cretinism. The original case of myxœdema first treated (hypodermically) years ago (by Murray) with Liquor Thyroidei enjoyed health by taking 10 minims of the Liquor each day—6½ ounces in the course of the year—less than a gallon in 22 years. As to other uses of Thyroid, the marked emaciation caused by excessive secretion in exophthalmic goitre indicates its employment in obesity—in some cases good results—with adequate diet. Also sometimes valuable in rickets, rheumatoid arthritis and nocturnal enuresis. As it improves the skin in myxœdema it has been used in psoriasis and other cutaneous diseases.—G. R. Murray, B.M.J. ii./13,163; L. ii./13,201. Murray's patient took Thyroid for 28 years. Atrophy of the thyroid need not shorten life provided this substitution treatment be fully maintained.—B.M.J. i./20,359.

In ***exophthalmic goitre*** Thyroid is totally ***unsuited***—it aggravates the condition. *cf.* Potassium Iodide. Arsenic and Ergot internally with Iodine locally reduced the swelling in a case but it returned, subsequently surgical measures produced good effect.—L. i./11,735.

Use of Suprarenal gland is successful, *v.* p. 967.

Myxœdema, on the other hand, is speedily improved by Thyroid and a more or less complete cure is established. 'The results,' says Osler, 'are unparalleled by anything in the whole range of curative measures. Within a few weeks a poor feeble-minded toad-like caricature of humanity may be restored to mental and bodily health.

V. Horsley had previously to Murray's work practised transplantation of sheep's thyroid gland into the tissues of a myxœdematous patient. Later McKenzie showed internal use of Thyroid preparation equally good.

The patient must continue to take the preparation more or less all his life.

Cretinism—Thyroid treatment. Results vary from complete idiocy to normality.—A. E. Naish, L. i./25,91.

A new conception of the thyroid gland. The Applied Anatomy and Physiology of the Thyroid Apparatus.—G. S. Williamson and I. Pearse, Brit. Journ. Surg. 1926, xiii,466; B.M.J. i./26,625.

Over-doses of Thyroid preparations may cause rapid pulse, 'racing' of the heart, feverishness, headache, pruritus, and even delirium. Chronic thyroid poisoning has also been observed—the symptoms being emaciation, muscular weakness, loss of hair, dilated pupils, and general debility.

Thyroid, Excessive use of (Police Court Case).—L. i./12,751.

A single large dose of Thyroid fed to goats produces no effect—the same quantity in small amounts over a period produces symptoms.—Prof. A. J. Clark, B.M.J. ii./25,847.

Thyroxin.—$C_{15}H_{11}O_4NI_4$ (*Harington*)=776·8212.

(The formula given in U.S. X., as found by E. C. Kendall, is believed to be incorrect.)

Dose.—The *preliminary* daily dose should never exceed 0·2 mgr. For an adult case of myxœdema the dose is about $1\frac{1}{2}$ mgr. Normally, an individual cannot take more than 2 mgr. a day continuously without developing signs of hyperthyroidism. U.S. X. gives 1/120th grain (0·0005 Gm.). The dose is taken whole *per os* with half a tumbler of water one hour before meals.

Thyroxin Tablets of the **Sodium Salt** are available of strength 0·2, 0·4, 0·8, and 2 mgr.

For *intravenous use* the dose in *crystals not* tablets is dissolved with aid of a drop of 10% Sodium Hydroxide Solution in 1 cc. of water. *Solutions must be fresh. Dose* from 1 to 10 mgr. The amount is determined by the basal metabolic rate. 1 mgr. increases the rate of an average adult 2%. With a myxœdema patient the maximum effect is produced on the tenth day after a single injection.

Caution.—The action of Thyroxin persists for about 15 days. Wait until effect has passed off before giving a further injection.

Stability.—Thyroxin may be boiled for hours in Baryta Solution without decomposing.

Preparation.—C. R. Harington received the Harrison Memorial Prize for his work on this compound. He describes in the Biochemical Jl., Vol. XX. No. 2, p. 293, a new method, using a dilute Barium Hydroxide solution for extraction. The method gives a yield of about 0·12% from the dry Thyroid gland, as against 0·0011% obtained by Kendall, using Sodium Hydroxide.

The Thyroxin finally obtained is perfectly white (though the preparation of commerce is yellowish), and crystallises in rosettes and sheaves of fine needles, darkening at 220° C., and melting with decomposition and evolution of Iodine at 231° C. to 233° C. Physiological tests gave a reaction typical of those described by American investigators for Thyroxin.

Though thyroxin reproduces the therapeutic action of thyroid, it is stated not to be present therein, but is produced during process of extraction. Thus the nature of the thyroxin-yielding substance is still a problem to be solved, as also what are the essential materials from its formation (presumably trytophane and iodine).

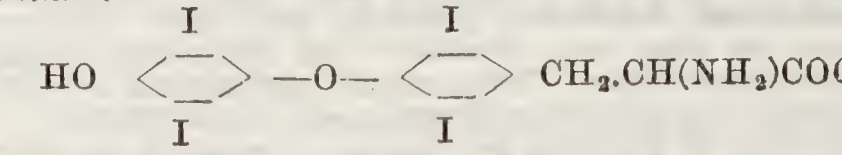
J. Huxley at Oxford stated that low forms of life, *e.g.*, tadpoles, under treatment with it, develop to the adult stage with greater rapidity than those without it. It might be utilised, the speculation goes, in influencing the sex of the offspring in man.

Thyroxin being an Iodine derivative of **Tryptophane** a substance normally present in the circulating blood as a product of protein digestion, there is a constant supply of raw material for its manufacture. In hyperthyroidism there is over-production and an abnormally high catabolism—the action of Thyroxin as a catalyst increases tissue destruction.—Pres., Oct., 1922, 311,334.

Synthesis of Thyroxin.

Hydroquinone monomethyl ether is combined with Tri-iodo-nitrobenzene, yielding the diphenyl ether $CH_3.O.C_6H_4.O.C_6H_2I_2.NO_2$. The nitro group is successively changed into an amino group, a cyanide group, and an aldehyde

group, which is then condensed with Hippuric Acid. Hydrolysis with Sulphuric and Hydriodic Acids yields the amino acid, $HO.C_6H_4.O.C_6H_3I_2.CH_2.CH.NH_2.COOH$. On iodising, Thyroxin is produced having the following structural formula :



After purification, the substance was found to have the properties of natural Thyroxin, both products being the racemic form.

Thyroxin is present in the thyroid as a constituent of a complex protein, being liberated by digestive ferments in the intestine, so that its action may not be absolutely identical with the gland substance.—C. R. Harington and G. Barger, Pres., May, '27,161.

C. R. Harington (Biochem. Jl., '26,300), in his work on the structure of Thyroxin, showed that Deiodothyroxin, a degradation product,w as α amino-β-4-(γ-hydroxyphenoxy)-phenyl-propionic. Acid. $HO.C_6H_4O - C_6H_4.CH_2 CH NH_2.COOH$. It is obtained by shaking Thyroxin in an atmosphere of Hydrogen with Palladium Hydroxide—Calcium Carbonate as catalyst—the Iodine atoms being replaced by Hydrogen.—G. Barger, B.M.J. i./26,1092; ii./26,1234 ; ii./27,861. L. ii./26,192 ; i./27,719. P.J. ii./26,734 ; ii./27,609.

The isolation, chemical constitution and synthetisation of Thyroxin.—Prof. Barger, C.D. ii./27,700.

Synthesis of Thyroxin.—P.J. ii./29, and 363,364.

The cost of synthetic Thyroxin is half that of the natural.—T. R. Parsons, *Daily Mail*, Dec. 18,'30.

Thyroxin was not patented by Harington. There is no master patent. A foreign manufacturer may become possessed of some patent which, of minor importance itself, may cut out the British maker in price. Vitamin D—Steenbock patented the irradiation of foods to make them antirachitic. The Britisher in general may be exploited.—L. i./30,720.

Hoffman-La-Roche relinquished claim to British Patent 318582 in respect of Thyroxin.—L. i./30,1434.

Uses.—The substance is thought to represent the therapeutic activity of the gland. It has been estimated that the body of a normal adult contains in all about 14 mgr. of Thyroxin, and that the daily rate of destruction of the substance is 1-1·5 mgr. : according to this calculation, therefore, a daily dose of 1·5 mgr. would be required to maintain the basal metabolic rate of a completely thyroidless individual at the normal level.

Under favourable conditions during its preparations it may be said that 1 Gm. (15 grains) of desiccated thyroid contains approx. 1 mgr. of Thyroxin, and this fact may be used to advantage in determining for a given patient the dose of Thyroxin, if a change is made from desiccated thyroid to Thyroxin.

A general quickener of metabolism. Uses and Abuses of Endocrine Therapy. —W. Langdon Brown, B.M.J. ii./25,1051.

The thyroid hormone alters the balance normally held between output of sugar from the liver and its removal from circulation under the influence of Insulin secreted by the pancreas, by accentuating the response of the liver and thereby increasing the hyperglycæmia produced by Adrenalin, and reducing the effect of Insulin.—J. H. Burn, P.J. i./26,292.

Function of Adrenalin may be to control oxidation.—H. E. Armstrong, Proc. Roy. Soc., '25,98,202. Moureu suggests the same as to Thyroxin. If this is confirmed it is remarkable that the two endocrine principles thus far isolated have similar function and are active at centres. Oxidation being one of the main functions of the living organism it is to be expected that the process is subject to rigid control in all its variations ; even Insulin at least serves to catch and prepare sugar for oxidation.—P.J. i./26,369.

Myxœdema.—Striking results with the synthetic product in two cases. —L. i./27,883.

It is calculated that one mgr. of Thyroxin causes an average increase of 2·8% in the B.M.R. In myxœdema, dried Thyroid ¼ grain should be given

once a day, increasing to twice a day at the end of one week, to ½ grain twice daily at the end of another week, and later to 1 grain twice a day.—H. Gardiner-Hill, L. ii./27,621.

In patients previously treated with dried Thyroid, 1 mgr. of synthetic Thyroxin produces action analogous to that of 0·2 Gm. of the dried gland. The initial dose of synthetic Thyroxin in the adult should not be more than 0·5 mgr.—per Pres., May, '29,158.

A case of myxœdema with B.M.R. 60·1% returned to normal after 6 or 7 weeks of oral administration of synthetic Thyroxin in total dosage of 3 mgr. An adequate substitute for gland preparations, but larger doses are necessary —per Pres., May, '29,158.

The natural Thyroxin is much more active than the synthetic.—Schittenhelm and Eisler, per Pres., May, '29,158.

The therapeutic use of Thyroxin is limited by the necessity for intravenous administration, as owing to its extreme insolubility it is absorbed irregularly when given by the mouth. Thyroxin probably exists in the gland as a constituent of a peptide or protein, but attempts to increase the solubility by preparing simple peptides containing Thyroxin have so far been unsuccessful. —Ashley and Harington.

See also Tests for Thyroid activity, p. 981.

Liquor Thyroidei, Thyroid Solution (B.P. 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), freshly prepared. 100 minims represent one entire gland.

It is better to add glycerin 15 to 20 of the sliced and bruised tissue, macerate 24 hours, press, and make up to the required volume with glycerin and water *partes æquales.* Mixtures should be prescribed with Chloroform Water.

It was a mistake to de-officialise this. It is a convenient mode of taking. During the war it was unavailable and patients had to be put on dried gland. They preferred to go back to the Liquor when it became available again.—W. Martin, P.J. i./23,233.

Flavoring.—Glyl or Syl Aurantii Floris, Glyl or Syl Amygdalæ Amaræ; Syrupus Limonis.

Assay.—*The author suggests Standardisation with a content of* **0·025 Gm.** *organically combined Iodine per* 100 *Cc., vide Vol. II.*

Hypodermic and Intravenous Injection of Thyroid Preparations.

Our experiments showed that Liquor Thyroidei B.P. *even with* the addition of 0·5% Phenol is not sterile. Further work showed that spores were not killed by boiling for ¼ hour in sealed ampoules, but a temperature of 120° C. for ¼ hour in the autoclave was sufficient to kill all bacteria.

This treatment causes coagulation of the albuminoid constituents and in all probability is injurious to the active thyroid principle.

Finally, experiments were made by the method of partial or intermittent sterilisation at 60° C. for ¼ hour for 10 successive days. In this case gelatinisation was less pronounced, but even this preparation was *not sterile.* Injections can, however, be made by means of a sterilised porous clay filter.—W. H. M. Expts., Nov., 1920.

Thyroideum Siccum. Dry Thyroid (*B.P.* '14). *Syn.* "Thyroid Extract." (Avoid the name "Extract.") Thyroïdine, P. Belg. IV.

Dose.—½ to 4 grains (**0·03 to 0·05 Gm.**), in cachets.

Should not exceed 15 grains daily.—W. W. W.

Prepared from healthy fresh glands of sheep; the surrounding fat, etc., is first removed; the glands are finely powdered after drying at not exceeding 40° C.; and finally the substance is freed from fat by Ether percolation. (One part equals about 5 of fresh gland.)

Assay.—*The author standardises this preparation to* 0·2% *Iodine in organic combination.* U.S. has this as average, P. Belg., IV. 0·2%.

Iodine in thyroid present in two forms, but only that present as Thyroxin is physiologically active. The Pharmacopœia Commission reports that Iodine should be determined in terms of Thyroxin Iodine. Inorganic Iodine should not exceed 10% of total Iodine.—C. R. Harington and S.S. Randall, Qtrly. Jl. Ph. '29,501. *See also* T. McLachlan, C.D. i./32,85.

P.G. VI. requires at least 0·18% Iodine with precise methods of detection of adulteration with Iodine compounds. P. Ned. specifies Thyroid must be desiccated at 30° C. and adjusts to 0·3% with Lactose. F. E. VIII. specifies sheep, ox or other animal used for food. 0·2% combined Iodine. P. Ital. V. is similar.

For Method of Assay, see Vol. II.

In many samples examined the Iodine content rarely, if ever, fell below 0·25% for Thyroideum Siccum.—W. Martin, P.J. i./23,233.

Thyroid **'Extract'** is an unfortunate name to indicate Thyroideum Siccum (*B.P.* '14). The fresh glands basis also introduces grave misunderstanding. Myxœdema, a case did no good with a course on the latter basis but when dosage of Thyroideum Siccum was given there was improvement at once.—A. E. Carver, B.M.J. ii./17,515. W. H. Martindale, in support of this letter drew attention to the necessity of standardising Thyroideum Siccum.—*Ibid.* 570. See also A. Goodall, B.M.J. i./14,1351.

Standardised Thyroid Tablets, $1\frac{1}{2}$ and 5 grains **(0·1 and 0·3 Gm.)**

(*We discard the old fresh substance basis for Thyroid Tablets as being unscientific and misleading. H. W. Paines repeats our advice which has been in the book for some* 20 *years to prescribe as Thyroideum Siccum.—L. i./32,168. For a number of notes on the matter see Edn. XIX., p.* 988, *and Vol. II.*).

1% Sodium Chloride or Potassium Nitrate as preservative is said to be desirable.—F. G. Hobart, P.J. i./26,329.

✱ **Thyroglandlin.** (T.M. 279708), is a trade brand of dry Thyroid. *Dose.*—3 to 5 grains.

'Four Gland' Tablets. *Syn.* Compound Thyroid Tablets *Martindale. Dose.*—One or two twice daily for adults,—young children in proportion.

These Tablets contain 1 grain each of Thyroid, Thymus, Suprarena and Pituitary Gland substance.

A treatment in mental and physical deficiency based on the therapeutic action of the internal secretions—the *combined action* of the internal secretions is aimed at. Correlated action in various diseased conditions between the thyroid and thymus gland, the suprarenal gland and the pituitary gland, etc., is proved also between the thymus and the suprarenals and testicle and ovary, also between the suprarenal, pancreas and pituitary and so on. In short physical, mental and metabolic changes occur as result of interference with the internal secretion of nearly all the ductless glands.

The above tablets have been given in myxœdema, in cretinism and infantilism with good mental and promising general results. Active rickets improved by half a tablet twice a day. Tablets containing extracts of the pancreas, testes and ovary also suggested.—A. S. Woodwark, St. Bart.'s Hosp. Rep. Vol. XLVIII.

'Three Gland' Tablets—omitting the suprarenal gland—have also been employed on the same lines.

Elixir of 'Four Glands,' *Martindale*, is also prepared. *Dose.*—1 to 2 drachms=1 to 2 'Four Gland' Tablets.

Elixir of 'Three Glands,' *Martindale.* *Dose.*—1 to 2 drachms =1 to 2 'Three Gland' Tablets.—These Elixirs have also been employed in the same conditions as the Tablets.

Mixed Gland Tablets, No. 1 (Male), contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ½ grain, Suprarenal Gland ¼ grain, Didymin ½ grain, Cerebrin ½ grain; *No.* 2 **(Female)** contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ½ grain, Suprarenal Gland ¼ grain, 'Varium' ½ grain, 'Mamos' ½ grain, Cerebrin ½ grain.
For pluriglandular therapy in instances in which it is difficult to determine which gland constituent is at fault.

✱ **Hormotone** (T.M. 365396) is described as a combination of hormones derived from the thyroid, pituitary, gonad and suprarenal glands. Each Tablet contains 1/20 grain of desiccated Thyroid and pituitary. *Dose.*—One or two tablets thrice daily before meals; not more than six per day. Stated to favour metabolism and increase mental, nerve, and muscular activity.—L. ii./13,84. **Hormotone without Post-Pituitary.** Tablets are also made for use in neurasthenia associated with high blood pressure and all hypertensive conditions.

Hormonigen Tablets.
Dose.—One or two tablets before meals.
Contain Thyroid, Pituitary, Ovary and testes. In neurasthenia and for pluriglandular therapy.

✱ **Incretone** (T.M. 482917).
Dose.—1 to 2 teaspoonsful before meals—children less.
Contains Thyroid, Pituitary and Gonads. For use in asthenia, general debility, etc.

Opocalcium.
Stated to include 'all the mineral constituents of the organism,' plus Thymus, Parathyroid, and Suprarenal extracts. In tablets or granules for tuberculosis debility, pregnancy, lymphatism, asthenia.

Tests for Thyroid Activity.

Basal Metabolic Rate (***B.M.R.***) means the rate of energy exchange in the body as seen under basal conditions (after elimination of movement, digestion, etc.). A relatively simple way of determination (as described by Benedict, Jl. A.M.A., July 23, 1921, p. 247, and Krogh, Brit. Ass. Rep., 1921, p. 445). is to measure the oxygen consumption of the patient during a given period. Air plus oxygen is rebreathed in a closed-circuit apparatus in which the exhaled CO_2 is absorbed, the diminution in volume of the gas indicates the amount of oxygen consumed. The B.M.R. does not vary as much as 10%. In hyperthyroidism it rises to 25 or 50% above normal, or even more; while in deficiency the rate falls below normal. To maintain it at normal. 12 to 14 mgr. of Thyroxin, Boothby has calculated, must be present in the system. The Thyroxin is used up at the rate of about 0·5 mgr. a day. In a case of myxœdema this amount would have to be given daily intravenously. The equivalent of Liquor Thyroidei (*B.P.*'98) estimated to be 10 minims or 5 grains of fresh gland.—Pres., Oct., 22,345; May, '24,192-195; L. i./23,131; G. R. Murray, Clin. Jl. Aug. 1, '23,362.
Determination and interpretation.—H. F. Moore, L. i./25,219.
Many cases of hyperthyroidism are diagnosed as neurasthenia and treated with tonics with little improvement. Determination of the B.M.R. will easily differentiate hyperthyroidism from other conditions.—H. W. Riggs, per Pres., May, '24,188.

References to Thyroid Treatment.

General References.

It is worthy of note that arsenic and iodine were used in the treatment of myxœdema long before these were found in the thyroid gland.

Numberless reports of the relief of myxœdema and cretinism have been recorded. Opinion varies as to its value in obesity. Has been used successfully in lupus, psoriasis, in pityriasis rubra, ichthyosis and alopecia; and in enuresis.

Position of the thyroid gland in the endocrine system—a powerful activator of metabolism. Co-operates with the adrenals and pituitary and antagonises pancreas and parathyroids.—W. Langdon Brown, B.M.J. i./22,85.

The thyroid is the gland of creation. Has anyone ever heard of a myxœdematous artist? Crichton Miller asks again for subthyroidic creators—be it of works of art or of children. The woman of artistic ability ceases to create works of art as soon as she is taken up with the maternal function.—B.M.J. ii./22,552.

The thyroid apparatus is primarily concerned in controlling the direction of protein synthesis within the body, the thymus being the reserve store of nitrogen.—G. Scott Williamson.—L. ii./23,1337.

Taking thyroid apparently caused disposition to chilblains. Any good in the past attributable to thyroid taking probably due to parathyroid contained.—D. C. Nasmyth, L. i./26,99. See also I. G. Cobb *ibid.*260.

Thyroid, the only endocrine substance which has any effect when given orally.—S. Vincent, Pr., Dec. '31,613.

Thyroid Therapy—a review of literature.—Pres., May, '29,167.

Specific References.

ACROMEGALY improved.—B.M.J.E. i./96,51; L. ii./96,614.

ALOPECIA.—Its association with thyroid dysfunction. Report of a case cured by thyroid treatment.—per Pres., Oct. '28,323.

AMENORRHŒA.—The function of the thyroid is (just before onset of menstruation and early in pregnancy) to stimulate calcium excretion which may take place from the uterus or failing that from kidney or bowel.—B.M.J. i./09,597. Dysmenorrhœa and even amenorrhœa are often marvellously benefited.—H. Ewan Waller, Pr., Aug., '12,279.

ARTERIO-SCLEROSIS.—Thyroid preparations are useful.—B.M.J. i./06,121.

CONSTIPATION.—Thyroid in ½ Gm. doses for 10 days increases peristaltic action. The dose is stated to be well tolerated by infants.—Pr., July, '30,253. *We advise caution.*

DERCUM'S DISEASE treated by 5 grains thrice daily. After two weeks reduced pain and alleviated numbness and tingling and reduced size of swelling.—B.M.J. ii./09,516.

ENURESIS, NIGHT TERRORS, ETC.—Original doses used were too large. Of value for children who show failure to grow.—W. Langdon Brown, L. i./25,739.

ECZEMA of infants. Suggestion for use in obstinate, and where the thyroid is thought to be functioning badly—well borne even by young infants and has proved successful.—Pres., June, 1911, p. 163.

X-Rays on thyroid glands (Rabbits),—effects.—B.M.J. i./12,28.

ECLAMPSIA should be treated prophylactically with thyroid. Relief of giddiness, swelling and check to albuminuria pronounced.—B.M.J. i./13,1272.

In auto-intoxication of pregnancy and impending eclampsia. Full doses.—L. ii./03,307.

CHRONIC SUBCUTANEOUS FIBROSIS treated by thyroid gland (or Liquid Extract of Fucus) diabetic diet, exercise and massage. Unless the obesity can be reduced, the prospects of improvement are slight.—B.M.J. i./11,354.

DEAFNESS in old people has been well treated by a small dose twice daily. Epilepsy in women also; number of fits reduced. There would appear to be some close connection between endocrine insufficiency and poisoning from intestinal absorption. The addition of an intestinal antiseptic, *e.g.*, Benzonaphthol or Calomel or Ichthyol, is useful.—F. J. Sadler, L. i./22,930.

DUPUYTREN'S CONTRACTION believed to be indicative of thyroid insufficiency. Thyroid gland thought to have improved cases. 1½ grains daily and in one case 163 doses were given.—K. Black, B.M.J. i./15,328.

GOITRE.—Thyroid medication apparently has a regulating effect on the calcium of the organism.—B.M.J. i./09,597. Theories have been promulgated

to show that types of goitre depend on the relative proportions of Calcium and Iodine in the blood.—Pres., Oct., 22,360 ; May, '24,186.

Unilateral exophthalmos following use of Thyroid. A case of myxœdema. 12½ grains daily taken during a year. Suggestion to limit sale of Thyroid.—T. Gillman Moorhead, B.M.J. i./31,442.

Hyperthyroidism is generally considered to be typically manifested in Graves' disease, and that many of its clinical symptoms are directly due to excess of thyroid secretion is proved by the fact that removal of portions of the Thyroid gland materially lessens or entirely eliminates the ill effects of the excess. The clinical signs of Graves' disease are not primarily all due to the increased thyroid secretion. The protruding eyeball for instance is now looked upon as the result of suprarenal excess.—H. Stanley Jones, Pres., Oct., 1922.

The problem of hypothyroidism, concerning the signs of which a small volume might be written, is the discovery of the underlying cause.—Pres., Oct., 22,314.

Infantile or adolescent myxœdema cured by Thyroid treatment—case described.—R. Hutchinson, per Clin. Jl., April 18/23,183.

GRAVES' DISEASE is usually secondary to some pre-existing chronic infection. It is usually associated with dental defects, tonsil and nasopharyngeal troubles, with rheumatism and with colonic disturbance. Give Tinct. Iodi Mitis 5 minims *t.d.*—H. Ewan Waller, Pres., Oct., 1922.

HÆMOPHILIA controlled by the liquor.—B.M.J. ii./00,1375.

HAY FEVER.—1 to 3 tablets daily will benefit.—M.A., 1908,37.

Hyper- and Hypo-Thyroidism.—The thyroid gland the storehouse for Iodine—without it the gland cannot functionate properly. Tincture of Iodine in treatment better than organically combined Iodides. In mastitis the larger nodular masses in the breast often readily dispersed by Thyroid, Iodine and decalcifying agents. Enlarged prostate similarly treated. An account of Albert Abrams' methods.—Sir J. Barr, Pr., June, 1921.

The ultimate effect of the activity of the thyroid *in situ* is to raise the blood pressure, and the same result is produced by administering Thyroid. Gross misuse of Thyroid had occurred through its recommendation as a means of reducing blood pressure.—H. Ewan Waller, Pr., May, '13,881.

Hypothyroidism and the ' vicious circle.' The forces of nature are often successful in breaking it. Owing, however, to the extraordinary instability of the thyroid, the reactions provoked by disease appear readily to paralyse the process of recuperation. In the case of the cretin the physician has a magic wand. In other cases the remedy is less striking, because the mischief is less apparent.—J. B. Hurry, Pr., April, '22,283.

ANTE-NATAL AND POST-NATAL INFLUENCES OF THE THYROID.—The presence of a living fœtus in the uterus appears to have a direct influence in exciting the thyroid into activity. It has been called the female gland because it plays a more important part in the physiology of the female than in that of the male. A woman may show few signs of hypothyroidism in pre-married life, but when put to the larger test of pregnancy the thyroid may fail adequately to respond. A liberal supply of thyroid hormone is most essential during gestation, and, if not forthcoming, disturbances of health are inevitable —affecting the mother, or fœtus or both. These disturbances can often be lessened or relieved by administration of thyroid substance. Thyroid deficiency may result in abortion, premature labour or abnormalities of the child. The comparative difficulty of rearing male children may be due to the fact that mothers of male children are unable to supply sufficient thyroid through their milk. Cow's milk varies in its Iodine content, and may be deficient in thyroid. Some cows persistently give a milk too low in Iodine content, and cow's milk in the summer shows a higher percentage of Iodine than in the winter. Hyperthyroidism in pregnancy, if not excessive, may be of advantage rather than otherwise. Disturbances in the thyroid function are the prelude to disorganisation of the functions of other endocrines.—H. Stanley Jones, Pres., May, '24,180-182.

Infection an important factor ; influenza one of the chief precursors, and rheumatic fever the next. A useful outline of the chief symptoms of hyperthyroidism. Any child developing an enlarged thyroid at or before puberty should have Iodine treatment. Average adult dose, 10 minims French Tincture of Iodine or Lugol's solution, in milk, once daily—halve this dose for a

child of 14. Treatment given for two weeks in every month ; no toxic symptoms with doses less than 30 minims when given over considerable period. See that pulse rate does not increase and gland does not become intense and hard. Elimination of sources of focal infection—teeth, tonsils, etc.—important and rest essential. If patient loses weight Insulin useful, 15 units daily. Thyroidectomy if necessary should only be undertaken after adequate Iodine treatment.—H. J. Starling, Clin. Jl., Feb. 8 and 15, '28.

Borax in small doses has been advised in hyperthyroidism, *v.p.* 12.

MENOPAUSE.—*Endocrine insufficiency.*—The neurasthenic discomforts of the climacteric in women treated by 1/10 grain B.P. Thyroid Siccum once daily. This is safe from risk of over-dose.

NEPHRITIS with œdema and albuminuria without hypertension.—Dried Thyroid 0·05 Gm. daily for several weeks, may give excellent results in.—Presse Med., Aug. 15, '25,1093, per Pres., May '26,187 ; Jl. A.M.A. ii./25,1010.

Obesity (*' Girdle ' obesity and ' Froelich syndrome '*). *See also Obesity—Therapeutic Index.*

Treatment by Thyroid and whole Pituitary Gland. *Tablets* of each gland (dried substance) are prepared, containing ½ grain, 1 grain, etc., up to 5 grains. Beginning with the smallest dose, 1 tablet of each is given, 3 times a day before food for 14 days. The dosage is increased each 14 days until a reduction in weight of 2½ lbs. weekly is obtained, and this dosage is continued until normal weight is restored. Disappointment with Pituitary medication by the mouth nearly always due to timidity in dosage ; give suitable doses. Some have tried Anterior Lobe only, but the whole gland is apparently better.

Thyroid in obesity in adolescents did good.—H. Gardiner-Hill, B.M.J. i./25,696.

The nervous excitation provoked by Thyroid medication to reduce weight may last for weeks and be disastrous.—B.M.J.E. i./25,30.

Certain cases of obesity, adolescent goitre and defective goitre treated by giving thyroid and pituitary simultaneously.—H. Gardiner-Hill, B.M.J. ii./25,1057.

Pneumonia. Manganese and thyroid treatment, see p. 547.

PRURITUS VULVÆ well treated with dried Thyroid gland obtained direct from slaughter house, 0·1 Gm. being given *per os* daily. Pruritus completely ceased after 2 weeks treatment but returned after discontinuation of treatment. 0·05 Gm. of the dried Thyroid substance daily was found to keep the pruritus at bay.—A. Bregmann, per Clin. Jl., Nov. 28, '23,575.

RAYNAUD'S DISEASE.—Thyroid toleration. A patient did not improve until ' 17 grains of thyroid gland ' were given a day.—H. W. Barber, L. i./22, 453.

RHEUMATOID ARTHRITIS.—With mercurial inunction as adjuvant ; remarkable results in a month.—B.M.J. i./10,1770 ; *see also* L. i./10,643.

Of 100 cases of rheumatic arthritis 70 felt distinct benefit after administration of combination of thyroid, pituitary, ovary and testes *per os.*—A. G. Watson, Pres., Nov. '26,411.

Menopausal arthritis should be treated with Thyroid ½–2 grains daily.—G. L. Kerr Pringle, Pres., Nov. '26,390. But J. H. Hannan, B.M.J. ii./27,15, says it should *not* be given at the menopause owing to its Adrenal sensitising action.

SKIN AFFECTIONS.—Psoriasis, alopecia, ichthyosis and xerodermia of unknown origin. If the gland is smaller than usual (found by palpation) try thyroid.—B.M.J. i./13,1037. Acne in youth is sometimes referable to hyperthyroidism.

A definite relation traced between the activity of the thyroid and certain skin diseases. Distinct improvement, *e.g.* in ichthyosis and eczema, following use of dried Thyroid and Calcium Chloride.—F. M. Pottenger, Endocrinol, Mar.-Apl. '26,105, per Pres., Oct. '26,343.

PSORIASIS.—Success is sometimes rapidly attained by the use of Thyroid 3 grains daily and externally Hutchinson's Paint (equal parts of Liq. Carbonis Detergens, Rectified Spirit, Lead Subacetate Solution, B.P.).—E. C. B. Ibotson, L. i./25,1182.

TERTIARY SYPHILIS.—Good results have been obtained with Thyroxin.—G. R. Murray, Clin. Jl., Aug. 1, 23,362. Young children treated.—Pres., May, '24,195.

Para-thyroid Gland.

These are four minute bodies embedded in the thyroid. They contain no Iodine. Their internal secretion possesses hormones which exert a powerful influence on the nervous system. (Sir E. Sharpey Schafer.)

The glands are as essential to life as the thyroid. On experimental removal, in addition to causing tetany and death in a few days, the lime content in the tissues is reduced, there is increased Calcium and Nitrogen excretion, increase in amount of absolute and relative Ammonia in the urine and increase in the Ammonia content of the blood. Parathyroid in effect, is held to regulate metabolism. It is also thought that thyroid secretion promotes metabolism and parathyroid renders the products formed innocuous.

Uses.—In tetany, tetany of pregnancy, tetany of childhood, epilepsy, paralysis agitans, sprue (with Calcium Lactate) and eclampsia.

Desiccated Para-thyroid Gland.

Dose.—1/60 grain (**0·001 Gm.**) to 1½ grains (**0·1 Gm.**) thrice daily.

The fresh parathyroid gland weighs on an average 0·09 Gm. This yields from 0·015 to 0·02 Gm. of desiccated powder, *i.e.*, 1=5 approximately of fresh substance.

Tablets contain 1/20 grain (0·003 Gm.), 1/6 grain (0·01 Gm.), ¼ grain (0·016 Gm.), and ½ grain (0·03 Gm.) Desiccated gland.

There is not enough Parathyroid in the country to keep one small manufacturing laboratory going.—H. H. Dale, L. ii./26,199.

Paratnyroid Extract (Liquid) (Collip), may be prepared by treating the glands with 5% Hydrochloric Acid for one hour at 100°. The solution is made alkaline after removal of fat and proteins. Hydrochloric Acid is then added to give maximum precipitation, and the solution is filtered. It is suggested that the potency of Parathyroid extracts can be estimated by the rise in Calcium in blood-serum of dogs.—J. B. Collip, E. P. Clark and J. W. Scott, Jl. Biol. Chem., 63, Mar. '25, p. 395 ; 64, p. 485.

Parathyroid, ovary and pancreas require some special method of extraction to obtain active preparations. It is necessary to break up combinations with lipoids to get water soluble preparations. Collip's preparation is effective given *per os.*—Swale Vincent, B.M.J. ii./25,1055.

Collip's Parathyroid used in a case where parathyroid gland had been removed in error. Injections proved curative.—**L.** i./26,874.

Parathyroid has a sedative effect on nervous tissues and promotes healing from effects of chronic sepsis. (Vines). Collip appears to have isolated the active principle.—W. Langdon Brown, B.M.J. ii./25,1051.

✱ **Parathormone-Lilly** (T.M. 481885) (Collip's Extract). A solution of the active principles of parathyroid gland of cattle. Relieves symptoms of parathyroid tetany and increases Calcium content of blood serum. Claimed to be specific in tetania parathyreopriva and to relieve acute and chronic tetany following thyroidectomy, so-called idiopathic tetany and infantile tetany. Use may be attended by great danger unless due precautions are taken to avoid overdosage.—Pres., May '26,191.

Endocrine factor in producing immunity and susceptibility of the teeth to caries. The parathyroids, *pars anterior* of the pituitary, medulla of suprarenal, with possibly the thymus gland, regulate absorption and fixation of Calcium, while the gonads (ovary and testes) and possibly the thyroid, regulate excretion.—F. W. Broderick, L. ii./21,1216.

Danger of overdosage. The hypercalcemia induced is not due to improved assimilation but is the cause of an increased loss of Calcium. Not to be used to promote Calcium assimilation, as it has the contrary effect.—Jl. A.M.A. i./26,352.

Long use bad as ' immunity ' is acquired against it.—J. C. Aub, M.A., '31,348.

Paroxysmal tachycardia. Parathyroid 1/10th gr. thrice daily used with remarkable effect.—C. Dukes, B.M.J. ii./21,987.

Elixir Parathyroid with Calcium Lactate, *Martindale.*

Dose.—1 drachm (4 Cc.), increased if necessary.

Contains 1/20 grain Dried Parathyroid Gland and 3 grains of Calcium Lactate in 1 drachm.

Calcium deficiencies treated by Parathyroid.—Varicose ulcer, found to improve under intramuscular injection of Calcium salts up to a point but did not proceed to complete cure ; under *Parathyroid,* healing was more rapid in cases at rest and in early cases. 1/10th grain of dried gland was given until laboratory tests showed that the ionised Calcium had returned to normal.—W. R. Groves and H. W. C. Vines, B.M.J. ii./21,40,152,687 ; L. ii./21,1383 ; B.M.J. i./22,791. Leucocytic activity is stimulated.—*Ibid.* i./23,106.

There is little evidence of a relationship between the calcium factor and the detoxicating function, but clinical results show a parallelism between the restoration of the calcium balance of the blood and improvement in general health.—H. W. C. Vines, Pres., Oct. 1922,339.

TETANY treated. Some good results have been reported.—Prof. Swale Vincent, L. i./23,130. Tetany, following removal of right lobe of thyroid gland benefited from parathyroid 1/10th grain hypodermically, and large doses of Calcium Lactate.—Davies, B.M.J. i./23,512.

Parathyroidectomised dogs can be kept alive without symptoms of tetany by diets containing (1) large amounts of lactose or (2) large amounts of Calcium salts.—Pres., May, '24,199.

Gastric, duodenal and varicose ulcers well treated.—L. Williams, B.M.J. i./23,1010.

Sprue.—Parathyroid 1/10 grain twice daily, with Calcium Lactate 10 or 15 grains 3 times daily gave good results.—H. Harold Scott, L. ii./23,876 ; B.M.J. ii./24,308, and V. Coates, *ibid.* 623 ; C. F. Shelton, B.M.J. ii./25,844.

But there is no statement that the author tried Calcium Lactate without the Parathyroid.—Prof. Swale Vincent, B.M.J. ii./25,1056. Vines says Scott obtained equally good results without Calcium at all, using the Parathyroid alone.—B.M.J. ii./25,1059.

SPRUE.—No conclusive evidence of efficacy.—Dan T. Davies, L. i./30,203. All the older remedies reviewed. Certain cases did well with Calcium and Parathyroid.—Lt.-Col. H. W. Acton, B.M.J. i./31,222.

Relation between the parathyroid and the pancreas.—Pres., May, '24,200.

TUBERCULOSIS. In view of the Calcium loss, characteristic of, parathyroid should be tried.

Psoriasis treated by Parathyroid 1/10 grain once daily.—B.M.J. i./24,772.

SPASMODIC RHINORRHŒA treated by Calcium Lactate 15 grains and Parathyroid 1/10 grain twice daily.—W. M. Mollison, B.M.J. ii./29,1052.

Use in tetany, œdema, epilepsy, hæmorrhage, jaundice.—Pres., May, '28, 165–8.

Acute parathyroid tetany relieved and controlled without use of parathyroid ; the parathyroids do not perform a metabolic function indispensable to life.—Dragstedt, per Pres., May, '29,172.

Parathyroid Therapy—a review of recent literature.—Pres., May, '29,174.

OTOSCLEROSIS treated by Dried Parathyroid, 1/3 or ½ grain daily, increased to 1½ or 2 grains. Hearing and general health improved.—E. Watson Williams, L. i./29,814.

Progressive muscular atrophy treated by Parathyroid Extract 1/10 grain hypodermically daily, Cod Liver Oil *per os* 1 ounce twice daily, and Calcium Chloride in solution 15 grains thrice daily.—T. H. Thomas, B.M.J. i./28,978.

Standardisation by means of incubation with a known amount of ***Guanidine*** (excess of this can be shown in the blood and urine in tetany, and in animals Parathyroidectomised).—H. W. C. Vines, B.M.J. ii./23,559. *See also Vol. II.*

Thyroidectin. *Dose.*—5 grains in capsules. The dried blood of thyroidectomised animals.

Has been given in Graves' disease on the theory that the serum of such animals contains substances which would neutralise the excessive formation of thyroid. **Thyroidectomised Goat's Milk** has also been used.

BLOOD TRANSFUSION.

The revival of this operation is due to the brilliant results achieved in the war. It enables loss of oxygen carriers and blood volume to be replaced.

In seriously ill persons before an operation, the administration of 200 to 500 Cc. of blood with a little Sodium Citrate added is resorted to. The mortality of influenza and pneumonia might be lessened by its use. Blood diseases, hæmophilia, purpura hæmorrhagica are also treated. There is, however, an incompatibility of bloods of certain individuals. Two such incompatibles cannot act as '*donor*' and '*recipient*' respectively.

Landsteiner's Law of iso-agglutinins. There are present in human blood two agglutinable substances, A and B, which react with specific agglutinins, *a* and *b*. If any blood contains an agglutinable substance, it will contain the agglutinin which reacts with the alternative agglutinable substance. Blood which contains A will contain *b* agglutinin and *vice versa*. Numbers are used for the groups. Thus Group II. possesses the agglutinable substance A and agglutinin *b*, Group III. the substance B and agglutinin *a*, Group IV. has both agglutinins but no agglutinable substance, and Group I. has both A and B but neither agglutinin. The Law is: "In any blood there are always present agglutinins against the agglutinable substances absent from the same blood."

With samples of serum from known Groups II. and III. it is possible to test any blood before a transfusion. For practical purposes the **corpuscles of the donor should not be agglutinated by the recipient's serum**, for although theoretically the donor's serum may agglutinate the recipient's corpuscles this serum is so largely diluted that this need not be considered.

Since the corpuscles of Group IV. are agglutinated by no serum of any other group, the members are 'Universal donors,' and generally a Group IV. blood is chosen. See however S. C. Dyke, L. ii./27,910.

Directions for testing.—Into a 'Wassermann' tube is placed a little N/10 sodium citrate in normal saline and four or five large drops of blood from finger are added. On to one end of a micro slide is placed a drop of Group II. serum, and on the other a drop of Group III. serum, to each of which is added a little of the corpuscle emulsion, each mixture being stirred with a glass rod and the slide gently rocked. Agglutination is visible to the naked eye, and appears as a deposit, the particles of which may get larger until in some cases a few crimson dots float in clear serum.

Albuminuria, cardiac debility and marked obesity would exclude the donor. —E. F. Skinner, B.M.J. i./23,750. *See also* ii./25,516.

Alternative procedure.—Some blood is taken from the recipient and centrifugalized to separate the clot. A few drops of the donor's blood are taken into a 1·5% solution of Sodium Citrate and shaken up. A drop of the serum is mixed with a drop of the corpuscular emulsion on a slide and a cover glass placed on it. If no agglutination in 5 minutes the donor's blood is suitable. No need to determine the group.—S. Wyard, Clin. Jl., May 2/23, 206.

Sodium Citrate 10 Cc. 2% added to 100 Cc. of blood as collected and the mixture filtered through gauze.—H. Pritchard, B.M.J. i./27,793.

References.—Lists of 'Universal Donors' are kept.—H. Wallace Jones, Pr. Mar., 1921. *Malignancy and blood grouping.*—All four groups liable to malignant disease, but groups 1 and 3 peculiarly susceptible.—M.P.C., Nov./22,301.

Kimpton-Brown method. A small amount of 3·8% Sodium Citrate used in the tube before puncturing the vein.—W. B. Gabriel, L. i./26,1255.

Medico-legal significance of groups. It is impossible to identify the father of a child, but it can be stated with certainty that the alleged father is not the father in fact.—L. ii./28,711.

1 Gm. Sodium Citrate in 60 Cc. water for each 450 Ccs. blood. An interesting paper with diagrams.—G. Keynes, Pr. Oct., '31,422.

B.M.A. Discussion, London, Oct. 26, '31. *Prof. A. Fleming.*—Whole blood largely replaced by citrated or defibrinated blood—the latter leaves the leucocytes undamaged, and easiest to apply. *Immuno-Transfusion* beneficial in some desperate cases. Procedures (1) introduction of Nuclein into the donor (2) injection into donor of hypertonic saline, increasing bactericidal power. *H. L. Tidy.*—In anæmia, hæmoglobin below 30% an indication for transfusion and below 25% transfusion imperative. *G. L. Keynes.*—Indicated in hæmorrhage and shock; in pre- and post-operative conditions—gastric and duodenal ulcer; in hæmorrhagic diseases; in blood-diseases—septicæmia; in bacterial infection—pneumococcal peritonitis. Calls on the London Blood Transfusion Service (voluntary donors) consistently increasing—2,000 calls during 1931—more than 100 hospitals called for its services. Good effects in more than 50% of cases. *J. Taylor.*—Always successful in hæmorrhage, but not in shock.—B.M.J. ii./31,802.

TABLE OF INFECTIOUS DISEASES.

Disease.	Incubation.	Quarantine.	Isolation of the Infected.
Chickenpox	11 to 19 days.	20 days.	Until every scab has fallen—pay attention to scalp. *See also* Therap. Ind.
Diphtheria.	2 to 10 days.	⇒	When a bacteriological examination of the throat and nasal mucus has been carried out with negative results on three successive occasions at intervals of two days—no antiseptic applications having been made to the throat and nose for at least three hours before taking the swab (*Quarantine*). In no case for less than four weeks, and until convalescence is completed, so that there is no longer any sore throat, or any abnormal discharge from the throat, nose, ears or eyes no cutaneous pustulation and no albuminuria and that at least two successive bacteriological examinations of the pharyngeal and nasal mucus for the specific bacillus made at intervals of not less than 2 days have been negative ; each examination having been made not less than three hours after the discontinuance of local applications (*Isolation*).
Influenza	41 to 45 hrs.	——	
Rubella (German Measles Rötein)	9 to 18 days.	20 days.	For not less than seven days from the date of the appearance of the rash provided there is no persistence of nasal or other symptoms.
Epidemic Roseola	9 to 18 days.	20 ,,	Evidence strongly against the conveyance of infection by the air.—F. H. Thornton, L. i./16,342.
Morbilli (Measles).	10 to 14 days.	16 ,,	Four days is stated to elapse between the onset of disease and the rash. The quarantine period is three weeks and the period of isolation of the infected is three weeks from date of appearance of rash.—Elem. Sch. Regns. '26, L. ii/27,826 The head of the family and the medical practitioner *should* notify. *See also* L. i./21,1353.
Mumps.	14 to 23 days.	24 ,,	For not less than two weeks from the commencement—provided that one clear week has elapsed since the complete subsidence of all swelling. No exclusion from school is recommended for contacts.—Elem. Sch. Regns. '26.
Scarlatina (Scarlet Fever)	1 to 8 days.	10 ,,	For not less than four weeks from the date of the appearance of the rash, provided convalescence is completed, and there is no sore throat discharge from the ear or nose suppurating or recently enlarged glands, or eczematous patches.
Variola (Smallpox).	10 to 14 days.	16 ,,	Until every scab has fallen off, and the skin lesions have all healed. Isolation should be for 6 weeks or until certified free from infection.—Elem. Sch. Regns. '26.
Typhoid Fever	7 to 21 dys.	23 ,,	Till the patient is well enough to go about : but he should be warned of the possibility of his spreading infection and directed how to prevent it.—E. W. Goodall, ' Infectious Diseases ' (Lewis).
Typhus.	5 to 14 dys.	14 ,,	4 weeks.
Whooping Cough.	7 to 19 days.	21 ,,	Until the characteristic spasmodic cough and the whooping have ceased for at least two weeks, or in case of persistent whooping in not less than six weeks from the commencement of the spasmodic cough.
Ringworm.	—	——	When the whole scalp, having been examined, not one broken off hair showing any of the forms of ringworm fungus is to be detected on microscopic examination.

Memo 51 '27 L. ii /27 826 Malaria, dysentery, acute primary pneumonia, and acute

POISONS.

The Chemist and Druggist is legally qualified to supply poisons and 'poisonous' substances—the latter being differentiated in their significance, *cf.* p. 992—without a medical man's prescription. In view of the exacting nature of the **Poisons and Pharmacy Act, 1908** (8 Edw. 7, ch. 55), it is of importance to be able to determine the position of any poison in the Schedule thereto, which is in two parts. We provide the Schedule and further details of the Act. As in past Editions we show Part I. Poisons by means of the sign [P1] and those in Part II. by (P). These signs precede the names of the poisons—once, as a general rule, under its main heading.

In determining whether an alkaloid is a poison or not, we take the dose and the uses in each case into consideration; there are few on the borderline between poison and non-poison.

A small amount of misuse of Cocaine has occurred in this country, but many of the reports are grossly exaggerated. The **Cocaine Substitutes** remain completely *unrestricted.* They are, further, not touched by the Dangerous Drugs Acts (*q.v.*).

As a further criticism, Mercuric Chloride cannot be bought by the public except under [P1] restrictions, but any quantity of aqueous solution (an ounce will dissolve in a pint) can be legally obtained as a (P) poison. In Northern Ireland, however, *preparations* of Sublimate *are* [P1] in addition to the chemical itself.

Pharmacists, it may be said, guard against misuse of poisons, *which they alone are permitted to sell in open shop.*

Local authorities who license persons other than legally qualified chemists, to sell "**Poisonous substances used exclusively in agriculture or horticulture**" should realise the seriousness of the duty entrusted to them. Facilities are granted for more easily obtaining arsenic and nicotine. Provisions are made for mineral acids and soluble salts of oxalic acid to be labelled "Poisonous." According to the Act, a body corporate, or in Scotland a firm or partnership, may carry on the business of Chemist and Druggist if the business is **under the control of a qualified superintendent.** Certificate of qualification of bona fide superintendent must be exhibited in the shop. The word Pharmacist can be used by Chemists and Druggists but not by companies.

At a B.M.A. meeting it was resolved that the *sale of Arsenical preparations,* included in Section II. of the Poisons and Pharmacy Act 1908 (*i.e., in the Schedule of Poisons*), should be limited (1) on the part of the seller to properly qualified and competent *pharmacists,* and (2) on the part of the purchaser *to those who had obtained a licence* for their possession.—Sir William Willcox, B.M.J. ii./22,374; P.J. ii./22,127.

The poisons Schedule is unintelligible.—Rutherford Hill, P.J.,i./26,13.

Amendment of the Pharmacy Act, defining Wholesale Sale, needed. Difficulties, *re* agricultural Arsenicals and insecticides for.—P.J. i./26,505.

Commission appointed to enquire into sale of poisons, retail and wholesale: keeping, distribution and supply.—B.M.J., ii/26,266.

Departmental Committee Report on the Poisons and Pharmacy Acts.—B.M.J. i./30,554.

The present system of Scheduling Poisons is inadequate to keep pace with the launching of new drugs. Drugs of the *Quinophan group* are not even on the Poisons Schedule, and *can be sold by any unqualified person.*—Sir Wm. Willcox, B.M.J. i./31,597.

SCHEDULE OF POISONS.

APPLICABLE TO GREAT BRITAIN.

(Under the Poisons and Pharmacy Acts as amended to date.)

Part 1 (marked [P1] in our text).

Not to be sold by retail unless the purchaser is known to, or introduced by some person known to, the seller who must be a registered Chemist and Druggist or registered medical practitioner; also *before delivery of the poison* entry to be made in poison-book of (1) date of sale, (2) name and address of purchaser, (3) name and quantity of article, (4) purpose for which it is wanted—attested by signature of buyer and if necessary of the person introducing him; and must be labelled with (1) name of article, (2) the word "Poison," (3) the proportion which the poison or poisons bears to the other ingredients, (4) name and address of seller. *See also* Regulations *re* bottles, etc., p. 993.

Aconite, Aconitine and their preparations.

Alkaloids.—All poisonous alkaloids, not specifically named in this Schedule and their salts and all poisonous derivatives of alkaloids. (*Altered March* 3, 1925.)

Arsenic, and (*all*) its preparations except preparations used exclusively in agriculture or horticulture for the destruction of insects, fungi, or bacteria, or as a sheep wash or sheep dip if the preparations are:

(1) Contained in a closed package or vessel distinctly labelled with a notice of the special purpose for which the preparation is intended; and
(2) Sold upon an order in writing given by or on behalf of a person, firm, or body corporate known to the vendor, and
(3) Purchased for the purpose of the trade or profession of such person, firm, or body corporate. (*Altered March* 3, 1925 *and August* 14, '26. *See* P.J. ii./26,102.) *See also* Arsenic Act.

Atropine, and its salts, and their preparations.

Belladonna, and all preparations or admixtures (except belladonna plasters), containing 0·1 or more per cent. of belladonna alkaloids.

Cannabis (the dried flowering or fruiting tops of the pistillate plant of *C. sativa*) and **resins** from it. (*Added March* 3, 1925.)

Cantharides and its poisonous derivatives.

***Coca,** any preparation or admixture of, containing 0·1 or more per cent. of coca alkaloids.

Corrosive Sublimate.

Cyanide of Potassium and all poisonous cyanides and their preparations.

***Diamorphine** (also known as **Heroin**), and all preparations or admixtures containing 0·1 per cent. or more of diamorphine. (*Added January* 3, 1921.)

Diethyl-Barbituric Acid and other alkyl, aryl, or metallic derivatives of Barbituric Acid, whether described as Veronal, Proponal, Medinal, or by any other trade name, mark, or designation, and all poisonous **Urethanes and Ureides.** (*These were transferred from Part II. to Part I. in* 1918.)

Digitalin and all other poisonous constituents of Digitalis. (*Added March* 3, 1925.)

***Ecgonine,** and all preparations and admixtures containing 0·1 per cent. or more of ecgonine. (*Added January* 3, 1921.)

Emetic Tartar, and all preparations or admixtures containing 1 or more per cent. of Emetic Tartar.

Ergot of Rye and preparations of ergots.

Lead, in combination with Oleic Acid, or other higher fatty acids, whether sold as Diachylon or under any other designation (*except* machine-made Plasters). (*Added May 27th,* 1917.)

Nux Vomica, and all preparations or admixtures containing 0·2 or more per cent. of **Strychnine.**

***Opium,** and all preparations or admixtures, containing 0·2 or more per cent. of morphine. (*Altered Jan.* 3, 1921.) **(TINCTURA OPII (LAUDANUM) B.P. '14,** is 1%.)

Picrotoxin.

Prussic Acid and all preparations or admixtures containing 0·1 or more per cent. of Prussic Acid.

Savin and its oil, and all preparations or admixtures containing Savin or its oil.

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* *See also Dangerous Drugs Acts.*

Strophanthin and all other poisonous constituents of Strophanthus. (*Added March* 3, 1925.)

Tobacco, any preparations or admixtures containing the poisonous alkaloids of Tobacco, other than Tobacco for smoking or Snuff, and for use in horticulture, etc., if packed, sold, etc., as sections 1—3 under Arsenic. (*Added March* 3, 1925 and *Aug.* 14, '26.) *See also* Arsenic Act.

PART II. (marked Ⓟ in our text).

Must be labelled with (1) name of article, (2) the word "Poison," and (3) the *proportion* of the poison, (4) name and address of seller who must be a registered Chemist and Druggist.

Almonds, Essential Oil of (unless deprived of prussia acid).

Antimonial Wine.

Barium Salts, all except the Sulphate. (*Added March* 3, 1925.)

Cantharides, tincture and all vesicating liquid preparations or admixtures of.

Carbolic Acid, and liquid preparations of, and its homologues containing more than 3% of those substances, *except* preparations for use as sheep-wash, or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticultural purposes for which the preparations are intended. (For Order in Council *re* Liquid preparations containing not more than 3% of Phenols, see page 992.)

Chloral Hydrate,

Chloroform and all preparations or admixtures containing more than 20% of chloroform.

Digitalis.

Mercuric Iodide.

Mercuric Sulphocyanide.

Oxalic Acid.

Poppies, all preparations of, excepting red poppy petals and syrup of red poppies (*Papaver rhœas*).

Precipitate, Red, and all oxides of Mercury.

Precipitate, White.

Strophanthus.

Sulphonal and its homologues, whether described as Trional, Tetronal or by any other trade mark, name, or designation. (*Added April* 14, 1913.)

Zinc Chloride and liquid preparations of zinc chloride, *except* preparations intended for soldering, or other purely industrial purpose, provided that they are contained in closed vessels labelled with the word "Poisonous" and bear the name and address of the seller and a notice of the special purpose for which the preparations are intended. (*Added January* 3, 1921.)

All preparations or admixtures *which are not included in Part I. of this Schedule, and contain a poison within the meaning of the Pharmacy Acts,* except preparations or admixtures the exclusion of which from this schedule is indicated by the words therein relating to carbolic acid and chloroform, and except such substances as come within the provisions of Section 5 of the Poisons and Pharmacy Act 1908.

Tobacco for Smoking, or snuff and machine-spread Lead Plaster are *excluded* from this clause (March 3, 1925).

Note.—The last paragraph in the Schedule brings into Part II. many preparations and admixtures not defined in the Schedule—in particular preparations and admixtures of vegetable drugs containing poisonous alkaloids should be borne in mind even though the drugs themselves are not in the Schedule. All such preparations are clearly indicated in our pages with the letter Ⓟ. Reference should be made to the body of the book in cases of doubt.

ORDERS IN COUNCIL.

Poisonous Substances. The Mineral Acids and Disinfectants.

Hydrochloric, Nitric and Sulphuric Acids.

Soluble Salts of Oxalic Acid.

Liquid Preparations containing more than 5% by weight of free Ammonia.

All Liquid Preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes, or Carbolic Disinfectant, containing not more than 3% of Phenols.

For each of these Poisonous substances see the body of the book.

These substances when sold by retail must be labelled:

(1). *With the name of the substance.*

(2). *"Poisonous" (not "Poison").*

(3). *"Not to be taken" (printed on the label).*

(4). *With the name and address of the seller, and any of them in liquid form must be in a bottle distinguishable by touch.*

The wording of the Order, it will be observed, specifies 'Phenols' whereas the wording in the Schedule of Poisons (Part II.) is CARBOLIC ACID *and its* HOMOLOGUES. *This wording is intended to apply also to* **Phenoloids** *where the word 'phenols' is used.*

Many deaths occur annually due to **Hydrochloric Acid.**

The **Ministry of Health** drew attention in 1928 to the danger of disinfectants given gratuitously or otherwise by local authorities in beer bottles, etc., and advised they should be in poison bottles, labelled boldly in red "Disinfectant —Poison—Not to be taken."—**P.J. ii./28,411.**

Agricultural and Horticultural Poisons.

(*See also* p. 172.)

Chemists and Druggists sell these substances under the same laws as apply to other Poisons, *i.e.*, the Pharmacy Acts, 1868, the Poisons and Pharmacy Act, 1908, and, if they contain Arsenic, the Arsenic Act, 1851. Other persons may, if they obtain licences for this purpose from the local County or Borough Council, sell Agricultural and Horticultural Poisons under Section 2 of the Poisons and Pharmacy Act 1908, subject to the Regulations made by Order in Council of 2nd April, 1909, and amended 1920, which require that "all poisonous substances shall be kept in a separate drawer or closed receptacle" and "sold at a separate counter" or "part of counter," that "A poisonous substance shall not be sold except in a closed vessel or receptacle as received from the manufacturer, which vessel or receptacle must be of sufficient strength to withstand rough usage, securely closed and free from leakage, and distinctly labelled with the name of the substance and the word 'Poison,' and with the name and address of the seller, and with a notice of the special purpose for which it has been prepared," and that "Each bottle, tin, drum, or cask shall have the word 'Poisonous' indelibly printed, marked, or branded in easily legible characters in a conspicuous position apart from the label, and the label must bear the word 'Poison.'" Further, the bottles must be distinguishable by touch from ordinary bottles. Note particularly Section 2 of the 1908 Act, "nothing exempts any person so licensed from the requirements of the 1868 Act and the Arsenic Act."

Provisions almost identical apply to Ireland (both Northern Ireland and the Free State).

Illegal sale of Horticultural Poisons. Prosecutions at Birmingham. The substance was not labelled 'Poison.' The name and address of the companies were not printed, and the sale was not entered in Register.—**L. i./31,1206.**

Regulations for the Keeping, Dispensing, and Selling of Poisons in Great Britain.

(*Prescribed by the Pharmaceutical Society and approved by the Privy Council.* These regulations, therefore, ***form part of the 1868 Act*** in pursuance of Section 1 of the Act.)

1. That in the keeping of poison each bottle, vessel, box, or package containing a poison be labelled with the name of the article, and also with some distinctive mark indicating that it contains poison.

2. Each poison to be kept on *one or other* of the following systems:—

(*a*) In a bottle or vessel tied over, capped, locked, or otherwise secured in a manner different from that in which bottles or vessels containing ordinary articles are secured in the same shop, etc.; or

(*b*) In a bottle or vessel rendered distinguishable by touch from the bottles or vessels in which ordinary articles are kept in the same shop; or

(*c*) In a bottle, vessel, box, or package kept in a room or cupboard set apart for dangerous articles.

3. That in the dispensing and selling of poisons all liniments, embrocations, lotions, and liquid disinfectants containing poison be sent out in bottles rendered distinguishable by touch from ordinary medicine bottles, and that there also be affixed to each bottle (in addition to the name of the article and to any particular instructions for its use) a label giving notice that the contents of the bottle are not to be taken internally.

WHOLESALE TRADING.

Wholesale trading is exempt from the provisions of Sections I.—XV. of the Pharmacy Act, 1868, *to which reference must be made.*

Attention is specially drawn to Section 17 *of the Act:—*

"*It shall be unlawful to sell any poison* **either by wholesale or retail** *unless the box (etc.) is labelled with the name of the article and the word Poison and name and address of Seller . . . but the provisions of this Section shall not apply to Sales* **by wholesale dealers to retail dealers** *in the ordinary course of wholesale dealing.*"

SALES TO MEDICAL MEN.

These are now governed by Section 3 of the 1923 Dangerous Drugs and Poisons (Amendment) Act, *q.v.*

[P1] POISONS THROUGH THE POST.

(*To Medical Men, etc.*)

This matter, which, in the past, caused pharmacists misgivings is now dealt with by the 'Amendment as to Dealing with Medical Men in [P1] Poisons in general' in Section 3 of the Dangerous Drugs and Poisons (Amendment) Act, 1923, see page 998, to which reference should be made.

SALE OF ARSENIC.

(*Applicable to Great Britain and Northern Ireland and the Irish Free State.*)

On every sale of Arsenic, *in addition* to the requirements of the Poisons and Pharmacy Act, 1908 ***(see Poisons Schedule),*** the following provisions of the Arsenic Act (1851) are to be observed. Particulars of sale to be entered in a book by the seller as follows:—

Date of Sale.	Name and Surname of Purchaser.	Purchaser's place of abode.	Condition or Occupation.	Quantity of Arsenic sold.	Purpose for which required.

(Purchaser's signature.) (Witness.) (Seller's Signature.)

Or if purchaser cannot write, seller to put the words "cannot write."

No person shall sell Arsenic to any person who is unknown to the person selling such Arsenic, unless the sale be made in the presence of a witness who is known to the person selling the Arsenic, and to whom the purchaser is known, and who signs his name, together with his address, to such entries before the delivery of the Arsenic to the purchaser, and no person shall sell Arsenic to ***anyone under full age.*** The orders from retailers to wholesalers must be *written.*

The Arsenic if colourless ***must be coloured with*** at least $\frac{1}{16}$ of its weight of ***Indigo or Soot,*** unless sold in a quantity of not less than 10 lbs. and for a purpose (*not* for use in agriculture) for which such admixture would render it unfit. Penalty for offence is a fine not exceeding £20.

The Act is not to prevent sale of Arsenic in medicine under a prescription of a legally qualified medical practitioner.

"Arsenic" includes ***Arsenious and Arsenic Compounds,*** and all other colourless preparations of same.

LABELLING OF POISONS ORDER, 1924.

Pursuant to Section 4, Sub-section 2, of the Dangerous Drugs and Poisons (Amendment) Act, 1923.

The *name* of the poison and the *proportion* which the poison (or poisons), bears to the other ingredients in every preparation must be stated, as percentage or otherwise, thus altering Section 17 of the Pharmacy Act '68 to that extent. B.P. or B.P.C. preparations sold with or without dilution need have only a reference to these works and when sold with dilution the proportion to the total ingredients, the label of pills, tablets, cachets, etc., must show the *amount* in each and the number in the container. This does not apply to *Dispensing. In force since Jan. 1st, 1926.*

The late Sir William Glyn-Jones suggested that the decisive test to be *applied by pharmacists* in any case is given by the question: 'Is this article as I sell it, an article *the sale of which is by the Pharmacy Acts confined to Pharmacists?*' If the answer is yes, it comes within the Labelling Provisions and the Order applies. Ammonia and other 'poisonous' substances are outside the Order.—P.J.ii./25, 716.

SCHEDULE OF POISONS APPLICABLE TO IRISH FREE STATE

[*In accordance with the Sale of Poisons (Ireland) Act, 1870, and Amendments by Orders in Council.*]

PART I.

Aconite and its preparations.
Alkaloids,—see Strychnine.
Arsenic and its preparations.
Cantharides.
***Coca,** any preparation or admixture of, containing 1 or more per cent. of coca alkaloids. (*Added Dec.* 8, 1921.)
Corrosive Sublimate.
Cyanide of Potassium and all metallic cyanides.
***Diamorphine** (also known as heroin) and all preparations or admixtures containing 0·1 per cent. of diamorphine. (*Added Dec.* 8, 1921.)
***Ecgonine** and all preparations or admixtures containing 0·1 per cent. of ecgonine. (*Added Dec.* 8, 1921.)
Emetic Tartar.
Ergot of Rye and its preparations.
***Opium,** and all preparations or admixtures containing 0·2 or more per cent. of ***Morphine.** (*Added Dec.* 8, 1921.)
Prussic Acid.
Savin and its oil.
Strychnine and all poisonous vegetable alkaloids and their salts.

PART II.

Almonds, Essential Oil of, unless deprived of its prussic acid.
Ammoniated Mercury.
Belladonna and its preparations.
Cantharides, the tincture and all vesicating liquid preparations of.
Carbolic Acid (*see Phenol*).
Chloral Hydrate and all its preparations.
Chloroform.
Corrosive Sublimate, Preparations of.
Diethyl barbituric Acid and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as Veronal, Proponal, Medinal or by any other trade name, mark or designation; and all poisonous urethanes and ureides. (*Added July,* 1914.)
Ether, Sulphuric.

**These also apply to Dangerous Drugs Acts in N. Ireland and Irish Free State.*

Mercury, Biniodide of.
Mercury, Red Oxide of.
Morphine, Preparations of.
Nux Vomica and its preparations.
Opium and all preparations of opium or **poppies.**
Oxalic Acid and all **oxalates.**
Phenol, commonly called carbolic acid.
Phosphorus and all preparations containing it in a free state.
Poppies, all preparations of (See Opium).
Strychnine, Preparations of.
Every Compound containing any of the poisons mentioned in this Schedule when prepared or sold for the destruction of vermin.

As regards the sale of Agricultural and Horticultural Poisons and Soluble Oxalates—*vide* Arsenic, also Acid. Hydrochloric, Acid. Nitric, Acid. Sulphuric, Acid. Oxalic, and Ammonia in the body of the book. *Vide* also Orders in Council pp. 992, 993.

NORTHERN IRELAND.

The Pharmacy and Poisons Act (N. Ireland), 1925.

The Poisons Schedule of this Act is similar to that of Great Britain, excepting Part I. '**Preparations of Corrosive Sublimate**' in addition to Corrosive Sublimate: Sulphuric Ether: Chloral Hydrate and its preparations; as to Arsenic and Tobacco, the alterations of March '25 and August '26 *do not apply.* Part II.: Phosphorus and all preparations and admixtures containing it in a free state.

The Arsenic Act 1851 applies, as also the D.D.A. 1920–1925 with some modifications.

Dangerous Drugs Regulations Northern Ireland, 1929, are in force.

Regulations as to Sale of 'Poisonous' Substances and Agricultural Poisons differ to an extent from those in Great Britain.

'Known to the seller.'—The knowledge should be sufficient to enable the seller to judge of the accuracy of the name and address which the purchaser gives, or to give the authorities sufficient data to enable them to identify the purchaser. (Quoted from Glyn-Jones 'The Law of Poisons and Pharmacy,' *re* Potassium Cyanide refused to be supplied to a medical man to kill wasps.)—P.J. ii./22,276, Medical Press, Sept. 6th, 1922.

PHARMACY AND POISONS BILL.

(Main contents of the Bill as amended by the Pharmaceutical Soc.)

Dispensing.—In shops, is restricted to chemists. In hospitals or doctors' surgeries, by, or under the supervision of, a chemist or medical practitioner.

Registration.—All chemists and druggists would become Pharmaceutical Chemists (the higher Examination would become a Fellowship).

Poisons.—The creation of a **Poisons Board** of 14 members to be an Advisory Committee to the Home Secretary to draw up a new Poisons List, to be divided into two parts:

Poisons in Part I., restricted to Chemists.
Poisons in Part II., restricted to other recognised and approved sellers.

The Poisons Board to have power to include in Part I. substances (not poisons in the common meaning of the term), such as Vaccines, Sera, Insulin, Pituitary, etc.—P.J. i./31,12,36,84; i./32,201.

The original Bill passed all its stages in the House of Lords and was awaiting further consideration on second reading in the Commons when Parliament dissolved.—P.J. ii./31,311; B.M.J. i./31,772.

At time of going to Press it is being introduced into present Parliament.

In **Victoria (Australia)** only Registered Chemists are allowed to sell substances mentioned in Part III. of the Second Schedule of the 1915 Poison Act. These include Bromides, Camphorated Oil, Phenacetin, Phenazone, and Phenylcinchonic Acid.—P.J. ii./28,174.

DANGEROUS DRUGS ACTS.—SUMMARY.

The following is merely a *summary* of main requirements concerning prescribing and dispensing.—*Vide postea.*

The Acts apply to :—

Opium (Medicinal) } Preparations containing 0·2% or
Morphine and its Salts } more of Anhydrous Morphine.

Morphine Esters, Salts and preparations, **Benzoyl Morphine** and preparations (restricted to licensees).

Cocaine (and synthetic), **Ecgonine and their Salts,** and preparations containing 0·1% or more of the alkaloidal bases.

Ext. and Tinct. Indian Hemp (as such), **Heroin,** and its Salts, **Dihydro - Oxycodeinone** (Eucodal) and its Salts, **Dihydrocodeinone** (Dicodide) and its Salts, and preparations containing *any* proportion of **Diacetylmorphine** (except those exempted), **Dihydro - Oxycodeinone** or **Dihydrocodeinone** or **Dihydromorphinone** (Dilaudide) or **Acetyldihydrocodeinone** (Acedicone)—*restricted to licensees.*

A prescription for these drugs must show :

(1) Patient's name and address. (2) Date.
(3) Total amount of the drug ordered (unless a preparation of the B.P., B.P.C., or N.H.I. Drug Tariff when the amount of the *preparation* may be given).
(4) Prescriber's usual signature (not initials) and (5) Address.
(6) If the prescriber requires, the intervals up to three, at which the prescription may be repeated.

Dental Prescriptions marked ' For local dental treatment only.'
Veterinary Prescriptions marked ' For animal treatment only.'

In Dispensing the Pharmacist must :

(1) Know the signature.
(2) Be satisfied that the prescription is genuine. If possible make sure that the medical practitioner, dentist or veterinary surgeon is on the Register.
(3) Mark prescription with date of dispensing.
(4) Retain prescriptions 2 years, in order, tied together.
(5) Record in book (D.D.A.), on the day or next day, and copy in Prescription Book.

Supplies to Medical Men (etc.).

This applies both to wholesale and retail. See Section 3 of 1923 Act.

All Sales of Dangerous Drugs (including preparations) *and Part I. Poisons* to be entered in Poisons Book and the *signed order* to be retained 2 years. There must be name and address (and date) and the nature and amount of the poisons.
Chemist must be satisfied as to genuineness.
If by post must be by *Registered Post.*

In *addition,* entry to be made in Cocaine, etc., Registers.

Medical men may only have Dangerous Drugs so far as is necessary for the practice of their profession.

The stock of dangerous drugs must be kept in a locked cupboard. The key is to be kept by the chemist or a qualified assistant.

DANGEROUS DRUGS ACT, 1920.

(10 & 11 Geo. V., Chapter 46.)

With the salient points from the 1923 *and* 1925 *Acts incorporated.*

[H] *Throughout our pages means drugs or preparations coming within the provisions of these Acts.*

(*In this Summary of the Acts, Rules and Orders, 'medical practitioner' means 'duly qualified, i.e., registered medical practitioner'; 'dentist' means 'registered dentist'; 'veterinary surgeon' means 'registered veterinary surgeon.'—W. H. M.*)

PART I.—*Sections* 1 *to* 3 relate to Importation intoand Exportation from the United Kingdom of **Raw Opium.** (U.K. includes Great Britain, Northern Ireland, and the Isle of Man, but excludes Irish Free State and C.I.).

Coca Leaves and **Indian Hemp**, and resins obtained from Indian Hemp, and all preparations (except Extract and Tincture of Indian Hemp) of which such resins form the base, are also included by virtue of 1925 Act and S.R. & O. 1928, No. 982.

PART II.—(*Section* 4). **Prepared Opium.** Import and Export *totally* and unconditionally prohibited. *Section* 5.—Any person manufacturing, selling or dealing in, or having in possession prepared Opium, being occupier of premises used for preparation of Opium for *smoking*, or sale or smoking of prepared Opium, or being concerned in managing of premises used, or having pipes or utensils, or smoking or frequenting a place used for smoking, is guilty of offence against this Act.

PART III.—Cocaine, Morphine, etc. (as detailed in Section 8). *Section* 6 -Import and Export prohibited, except under licence. *Section* 7, Sub-section 1. Manufacture, sale and distribution to be limited to persons licensed or otherwise authorised.

Sub-section 2.—Authorisation—under this section—of persons keeping open shop under the Pharmacy Act 1868 (as amended 1908).

Sub-section 3.—Nothing herein derogates from the provisions of the Pharmacy Act 1868, as amended 1908.

Section 8, Sub-section 1.—The drugs to which this part of the Act applies are ***Medicinal Opium, Morphine and its Salts, Cocaine*** and synthetic Cocaine, Ecgonine, and their Salts: ***Diacetylmorphine*** (***Heroin***) and its Salts; *also*—

Extracts and Tinctures of ***Indian Hemp*** (***not including*** medicinal preparations containing the Extract or Tincture as ***one of the ingredients), Benzoyl-Morphine*** and its Salts (***to be supplied by Licence only***—S.R. & O., 1928, No. 925), ***Dihydro-oxycodeinone*** (Eucodal) and its Salts, ***Dihydrocodeinone*** (Dicodide) and its Salts, and any ***preparation,*** admixture, extract, or other substance containing ***1/5th per cent.*** or more of ***Morphine, 1/10th per cent.*** or more of ***Cocaine*** or Ecgonine, or ***any proportion of Diacetylmorphine*** (certain preparations are ***exempt*** by S.R. & O. 1931, No. 300, see p. 560), Benzoyl-Morphine, Dihydro-oxycodeinone, or dihydrocodeinone.

Also ***Esters of morphine*** and their respective Salts, and to any preparation, admixture and extract containing any of the said esters (added Aug. 15, 1929—S.R. & O. 1929, No. 650).

Further, ***Dihydro-morphinone*** (Dilaudide) and its Salts, and any preparation, admixture, extract, or other substance containing any proportion of Dihydro-Morphinone (added June 13, 1930—S.R. & O., 1930, No. 520). (Dilaudide, its salts, preparations, etc., may not be imported into, or exported from, the United Kingdom and Northern Ireland without a Licence issued by the Secretary of State), *also* ***Acetyldihydrocodeinone*** (Acedicone)—added June, 1932.

Sub-section 2.—By Order in Council this part of the Act *may* apply to new derivatives of Morphine, Cocaine, or alkaloids or other drugs.

(Percentage is dealt with under Section 5 of the 1923 Act, *q.v.*).

PART IV—*Section* 9, Sub-section 1.—Application of Customs Acts.

Section 10, Sub-section 1.—A constable or person authorised by a Secretary of State has power to inspect books or documents relating to dealings and stocks (see also Amendment in the 1923 Act). Sub-section 2.—Any person delaying, or obstructing, or failing to produce, or concealing, or attempting

to conceal books, stocks, drugs or documents shall be guilty of an offence (an Amendment made in the 1923 Act is included herein).

Section 11.—Refers to regulations which may be made under this Act.

Section 12.—Refers to Licences (including payment of a fee).

Section 13.—On indictment (Assizes or Quarter Sessions) or Summary Conviction heavy punishments involved and the offender's authorisation may be withdrawn.

Sub-section 2B.—(FROM THE 1923 ACT.) If any person attempts to commit an offence, or solicits or incites another person to commit it, he shall, without prejudice to any other liability, be liable on summary conviction to the same punishment and forfeiture as if he had committed it.

Sub-section 2C.—(FROM THE 1923 ACT.) Where a person convicted of an offence is a *company*, the chairman and every director and every officer concerned in the management of the company shall be guilty of the like offence unless he proves that the act constituting the offence took place without his knowledge or consent.

Sub-section 3.—Refers to time of bringing proceedings both against a company and also (from the 1923 Act) against a person *attempting* or *soliciting* or *inciting* another person to commit the offence.

Section 15 of the 1920 Act, Sub-section 1.—

"**Raw Opium**" includes powdered or granulated Opium, but does *not* include medicinal Opium.

"**Prepared Opium**" means prepared for smoking including dross and residues remaining after Opium has been smoked.

"**Medicinal Opium**" means raw Opium artificially dried. (A correct definition appears in the 1925 Act, *q.v.*).

Section 16.—In application to Ireland the Act has effect subject to :—

(*a*) A reference to the Poisons (Ireland) Act 1870, the Pharmacy (Ireland) Act, 1875, and the Pharmacy (Ireland) Act 1875 (Amendment) Act, 1890, being substituted for reference to the Pharmacy Act, 1868, and

(*b*) Reference to the Pharmaceutical Society of Ireland being substituted for the Pharmaceutical Society of Great Britain.

DANGEROUS DRUGS AND POISONS (AMENDMENT) ACT, 1923. (17*th May*, 1923.)

(13 & 14 GEO. 5.)

An Act amending the Dangerous Drugs Act, 1920, *and Section seventeen of the Pharmacy Act*, 1868, *and to prescribe the method of calculating percentages in liquid preparations for the purpose of the Poisons and Pharmacy Act*, 1908, *and the D.D.A.*, 1920.

1.—(1) This sub-section to be inserted in section 10 of the Dangerous Drugs Act, 1920, after sub-section (1), concerns searching of premises under Authority of Justice of the Peace.

(2) Amendments in this sub-section of Section 10 of the 1920 Act have been made in our pages.

2. This section in several sub-sections, is to be substituted in the 1920 Act bringing in a wider scope of definition of a person guilty of offence, *e.g.* with regard to false declarations, also as to *aiding* and *abetting* in any place even *outside* Great Britain in an offence punishable under any corresponding law in force in that place. *The salient points of sub-sections* 2 *and* 3 *of this section we have incorporated in the* 1920 *Act.*

Amendment as to dealing with Medical Men in [P1] **POISONS IN GENERAL.**

3.—(1) So much of section 17 of the Pharmacy Act, 1868, as requires an entry in the Poisons book signed by the purchaser, shall not, subject to the following conditions, apply where the purchaser is a medical practitioner and the purchase is made by him for the purposes of his profession.

(2) (*a*) There must have been received by the seller before the sale a ***written order*** signed by the purchaser stating his name and address and the name and quantity of the article to be purchased.

(*b*) The seller must be ***reasonably satisfied*** that the signature is the signature of the person purporting to sign it, and that that person is a medical practitioner.

(*c*) The article sold, if sent by post to the purchaser, ***must*** be sent ***by registered post.***

(*d*) The seller must enter in the ***Poisons Book,*** in the column assigned to the signatures of purchasers, the words ***"signed order"*** with the ***date*** on which the order is ***executed*** and must preserve the order for two years from the date of the entry.

If a seller is reasonably satisfied that a ***medical practitioner*** desiring to purchase the poison urgently requires it for his profession, but by reason of some emergency is ***unable*** before delivery, either ***to furnish to the seller*** an order in writing duly signed, or to attend and sign the Poisons Book, the seller may send the poison to the purchaser to ***be handed over*** to him either ***in exchange*** for such an order or on an undertaking by the purchaser to furnish such an order within 24 hours.

If the purchaser by whom the undertaking has been given fails to deliver a signed order, or if any person for the purpose of obtaining delivery of the poison under the foregoing proviso makes a statement which is to his knowledge false, he shall be deemed to have procured the commission of an offence under the said Section 17.

(3) This section applies also to dentists and veterinary surgeons.

4.—(1) Where any poison to which Section 17 of the Pharmacy Act, 1868, applies is supplied in accordance with a written N.H.I. PRESCRIPTION given by a medical practitioner the seller shall not be required to make any entry in the book (Poisons Book) in accordance with the said section. (NOTE.—This does not exempt Dangerous Drugs in D.D. Register).

(2) Section 17 of the Pharmacy Act 1868 shall have effect as if, for the words "labelled with the name of the article and the word poison and with the name and address of the seller of the poison," there were substituted the words "labelled with the name and address of the seller of the poison, with the word 'poison,' and with the name of the poison and in the case of a preparation which contains a Poison as one of the ingredients, with *data as to the proportion which the poison bears to the other ingredients as may be prescribed by Order.*" The ***Labelling Order 1924*** is given *antea* p. 994.

5.—For the purposes of the Schedule to the Poisons and Pharmacy Act 1908, and of section 8 of the Dangerous Drugs Act, 1920, ***percentages,*** in the case of liquid preparations shall, unless other provision in that behalf is made by regulations under those Acts respectively, be calculated on the basis that a *preparation containing one per cent. of any substance means a preparation in which one gramme of the substance, if a solid, or one millilitre of the substance,* if a liquid, is contained in *every one hundred millilitres of the preparation,* and so in proportion for any greater or less percentage.

6.—(Sub-section 2) "Corresponding law" in the 1920 Act, as amended by this Act, means any law stated in a certificate purporting to be issued by or on behalf of the government of any country outside Great Britain to be a law providing for the control and regulation in that country of the manufacture, sale, use, export and import of drugs in accordance with the provisions of the *International Opium Convention* signed at the Hague 23/1/1912, and any statement in any such certificate as to the effect of the law mentioned in the certificate, or any statement mentioned in any such certificate that any facts constitute an offence against that law, shall be conclusive. (Sub-section 3). This Act shall not extend to Northern Ireland, except in matters in which the Parliament of Northern Ireland have not power to make laws.

DANGEROUS DRUGS ACT, 1925.

(15 & 16 GEO. V., CHAPTER 74.)

(*In operation since Sept.* 25, 1928—*S.R. & O.* 1928, *No.* 634).

Section 1.—Extends restriction of import and export of Coca Leaves, Indian Hemp (and Resins of), and all preparations as in the case of Raw Opium (S.R. & O. 1928, No. 982). *See* Principal Act.

Section 3.—Amends the list of drugs in Part III. of the 1920 Act, and includes ***any proportion of Diacetylmorphine.*** (***Since brought up-to-date by further additions.***)

Section 4.—**Medicinal Opium** means Raw Opium, adopted in accord with the B.P., whether powder, granulated, or any other form, and whether or not mixed with neutral substances.

Section 5.—Power to exclude preparations.

The salient points are incorporated in the 1920 ***Act, antea.***

DANGEROUS DRUGS (CONSOLIDATION) REGULATIONS, 1928

MADE UNDER SECTION 7 OF THE 1920 ACT FOR CONTROLLING THE MANUFACTURE, SALE, POSSESSION, AND DISTRIBUTION OF DANGEROUS DRUGS TO WHICH PART III. OF THE ACT APPLIES.—S.R. & O. 1928, NO. 981.

Regulation 1—Manufacture. (*a*) Only an authorised person may manufacture (*b*) on authorised premises, (*c*) in accord with the terms and conditions of his authority.

2.—Supply and procuring of drugs and preparations. Except as provided a person shall not offer to supply or procure to or for any person, including himself, either in Great Britain or elsewhere, or advertise for sale, (*a*) unless authorised, (*b*) otherwise than in accord with the terms and conditions, (*c*) if the drug, etc., is to be supplied to or procured for a person in the U.K., unless he is authorised to be in possession, or to or for a person authorised, otherwise than in accord with the terms and conditions of that person's authority.

In regard to (*c*), the ***administration of a drug,*** etc., by, or ***under the direct personal supervision,*** and in the presence of, a medical practitioner, or by a dentist for dental treatment, ***shall not be deemed supplying.***

3.—Possession. (1) A person shall not be in possession unless authorised. (2) (*a*) A person to whom a drug, etc., is lawfully supplied on a prescription by a medical practitioner, dentist, or vet. surgeon, or to whom a drug is lawfully supplied by a medical practitioner or vet. surgeon, dispensing medicines, is authorised to be in possession.

Provided that if a drug, etc., is supplied by, or on a prescription given by, a medical practitioner to a person ***who was at that time under treatment, whether for addiction or otherwise,*** from and being supplied with a drug, etc., by, or on a prescription given by, ***another medical practitioner, that person is not authorised to be in possession of the drug, etc.,*** supplied by, or on the prescription given by, the first-mentioned medical practitioner ***if he did not, before the supply thereof to him, disclose that he was being treated and supplied by the other medical practitioner.***

(*b*) A person shall be deemed to be in possession if the drug is in his actual custody or is held by any other person subject to his control or for him or on his behalf.

4.—Delivery to messengers. (1) Where a drug is to be lawfully supplied to anyone ('the recipient') otherwise than by, or on a prescription given by, a medical practitioner, the person supplying ('the supplier') shall not deliver it to a person who purports to be sent by or on behalf of the recipient unless that person (*a*) is an authorised person under the Acts, or (*b*) produces to the supplier a written statement signed by the recipient that he is ***authorised by the recipient to receive the drug on the latter's behalf, and the supplier is satisfied that the document is genuine.*** (2) A person to whom a drug or preparation is so delivered is an authorised person, but for such period only as reasonably suffices for the delivery.

5.—General authority. (1) (*a*) medical practitioners, (*b*) dentists, (*c*) veterinary surgeons, (*d*) pharmacists dispensing at a public hospital or institution, (*e*) persons in charge of a laboratory used for research or instruction and attached to an institution approved by the Secretary of State, (*f*) persons appointed by a local authority as analysts for the Sale of Food and Drugs Acts, 1875 to 1907: are authorised, so far as may be necessary for their profession or employments, as members of their respective classes, to be in the possession of and to supply the drugs, but ***a dentist may not supply drugs otherwise than by his personal administration to persons receiving treatment from him.*** (2) An 'institution' is a University, university college, public hospital, or other like institution.

6.—(1) Persons keeping open shop for the retailing of poisons are authorised (*a*) ***to manufacture*** at the shop in the ordinary course of their retail business (i) ***extract or tincture of Indian Hemp:*** (ii) any preparation; and (*b*) subject to the provisions of the Regulations, to carry on at the shop the business of retailing, dispensing or compounding drugs or preparations. (2) ***Every drug or preparation*** in the actual custody of a person authorised by this Regulation ***shall be kept in a locked***

receptacle which can be opened only by him or by some assistant of his being a pharmacist.

7.—Withdrawal of Authority. (1) if any authorised person is convicted of an offence against the Act, or under the Customs enactments as applied by the Act, the Secretary of State may, by notice in the *Gazette*, withdraw his authority, after consulting the Council of the Pharmaceutical Society of Great Britain. (2) If the person whose authority is withdrawn is a medical practitioner, dentist, or veterinary surgeon, the Secretary of State may, by notice in like manner, direct that it shall be ***unlawful for that person to give prescriptions.*** (3) If the Secretary of State suspects that a medical practitioner or dentist is supplying or prescribing drugs to or for either himself or any other person otherwise than properly required for medical or dental treatment of himself or that other person, ***the Secretary of State may refer the matter to a tribunal*** constituted as stated in the First Schedule, and, if the tribunal so recommend, may, by notice in the *Gazette* withdraw the authority of the practitioner or dentist to supply, procure, or be in possession and give directions to him as under paragraph (2) of this Regulation.

8.—(1) A prescription means a prescription directing the supply of a drug and given either by a medical practitioner for medical treatment, by a dentist for dental treatment, or by a vet. surgeon for animal treatment. (2) The prescription must (*a*) be in writing and be ***signed by the person giving it*** with his usual signature and be dated by him, and (*b*) except in a health insurance prescription, ***specify the address of the person giving it,*** (*c*) ***specify the name and address of the person for whose treatment it is given,*** or, if it is given by a vet. surgeon, ***of the person to whom the article prescribed is to be delivered,*** (*d*) have written thereon, ***if given by a dentist, the words 'For local dental treatment only,'*** and, ***if given by a vet. surgeon, the words 'For animal treatment only,'*** (*e*) specifiy, if it prescribes a preparation contained, or compounded of preparations all of which are contained, in the B.P., the B.P.C., or the N.H.I. Drug Tariff, ***the total amount of the preparation, or of each preparation,*** as the case may be, and in any other case ***the total amount of the drug to be supplied.***

9.—(1) A person shall not supply a drug on a prescription (*a*) unless the prescription complies with the above, and (*b*) unless in the case of a health insurance prescription ***he has no reason to suppose that it is not genuine,*** or, in the case of any other prescription, he either (i) is ***acquainted with the signature of the person*** by whom it purports to have been given, and has no reason to suppose that it is not genuine, or (ii) has taken ***reasonably sufficient steps to satisfy himself that it is genuine.*** (2) If a prescription expressly states that it may, subject to the lapse of a specified interval or intervals, be dispensed two or three times, the drug may be supplied a second or a third time after the specified interval or intervals, but otherwise a ***prescription shall not be taken to authorise the drug to be supplied more than once.*** (3) The person dispensing shall, at the time, mark on it the ***date on which it is dispensed,*** and, in the case of a prescription which may be dispensed two or three times, the ***dates of the second and third time,*** and, unless it is a health insurance prescription, retain it and keep it on the premises to be available for inspection.

10.—Marking of packages or bottles. (1) No person shall (*a*) supply a drug unless ***the package or bottle is marked with the amount contained,*** or (*b*) supply a preparation, unless the package or bottle is plainly marked (i) in the case of a powder, solution, or ointment, with the ***total amount contained and the percentage of the drug contained,*** or (ii) in the case of tablets or other similar articles, ***with the amount of the drug in each article*** and ***the number of articles*** contained. (2) This does not apply to a lawful prescription.

11.—Records. (1) Every person authorised to supply shall (*a*) keep a register and set out as in Parts I and II of the Second Schedule true particulars as to every quantity of drug or preparation obtained by him and supplied by him, whether to persons within or without Gt. Britain, (*b*) ***a separate register*** or separate of the register shall be used ***for each of the various classes of drugs*** and preparations, (*c*) the entry must be made on ***the***

day on which the drug is received, or which the transaction takes place, or, if that is not practicable, on the ***following*** day, (*d*) a separate register shall be kept in respect of each set of business premises, and, subject to the approval of the Secretary of State, an authorised person may keep a separate register for each department of the business, (*e*) ***no cancellation, obliteration, or alteration, shall be made,*** and any correction of an entry must be made by way of a marginal or footnote giving the date of correction, (*f*) the authorised person shall, on demand, furnish particulars required as to the obtaining or supplying or as to stocks, (*g*) the register may be used for entries required under Sect. 17 of the Pharmacy Act 1868, but, save as aforesaid, not for any other purpose. (2) The entering in the register shall not apply to (*a*) ***a medical practitioner who enters in a day book*** particulars of every drug or preparation supplied by him to any person, with the name and address of that person, and the date of supply, ***and enters in a separate book*** kept for the purposes of the Regulation a reference to each entry in the day book which relates to the supply, or (*b*) ***a person keeping open shop*** for the retailing of poisons who ***enters in a separate book*** kept for the purposes of this Regulation a ***proper reference to each entry in a Pharmacy Act book*** which relates to the supply of any drug or preparation. (3) References in the separate book must be made in chronological order, and ***the book must be kept in separate parts relating respectively to each of the several classes of drugs*** and must not be used for any other purpose. (4) The entry in the day book or separate book must be made on the day an entry would have been required to be made. (5) Every register, separate book, or day book in which any entry with respect to the supply of a drug or preparation is made, and every Pharmacy Act Book containing an entry referred to in the separate book shall be kept on the premises to which the register or book relates or where the prescription was dispensed, so as to be available for inspection. (6) Every entry ***and every correction*** must be made in ink, or indelibly written. (7) (i) A drug or preparation administered by, or under the direct supervision and in the presence of a medical practitioner or a dentist shall not be deemed to have been supplied by him; (ii) a 'proper reference' means a reference entered in the separate book under the same date as the entry in the day book or Pharmacy Act book, and otherwise such as to enable the entry to be easily identified.

12.—Export. (1) If any drugs or preparations authorised under the law of any country outside the U.K. to be exported therefrom to any destination outside the U.K. are brought into the U.K., no person shall without authority from the Secretary of State, cause or procure those drugs to be diverted to any other destination. (2) The destination to which any drugs are authorised to be exported shall be taken to be that stated in the authority for export from the country of export.

13.—Special provisions for ships. (1) The master of a ship not carrying a medical practitioner is authorised (*a*) so far as necessary for compliance with the Acts relating to merchant shipping, to be in possession of drugs and preparations, and (*b*) subject to conditions imposed by the Secretary of State, and Board of Trade instuctions, ***to supply drugs to members of the crew.*** (2) Where a drug is supplied to a member of the crew entry in the official log-book, in accordance with para. 5, Sect. 240, of the Merchant Shipping Act, 1894, of ***the treatment adopted*** shall be ***sufficient record, if the entry specifies the drug supplied.*** (3) The master of a foreign ship in a port in Gt. Britain is authorised to purchase and be in possession of such quantity of drugs or preparations as may be certified by the M.O.H. of the port, or the assistant M.O.H. to be necessary until the ship reaches its home port. ***A person who supplies a drug or preparation on such a certificate shall retain the certificate and mark it with the date the drug was supplied*** and keep it on his premises for inspection.

14.—All registers, records, books, prescriptions, and other documents kept, issued, or made in pursuance of the requirements of these Regulations must be kept, ***in the case of a register, book, or other like record, for two years from the date of the last entry, and in the case of any other document for two years from the date it is issued or made.***

15.—The Secretary of State may, subject to such conditions as he may prescribe, exempt any hospital or other public institution from any provision of these Regulations.

16.—Nothing in these Regulations shall apply to any of the preparations mentioned in the Third Schedule or to a drug or preparation denatured as approved by the Secretary of State.

17.—(1) In these Regulations the following expressions have the meanings hereby assigned to them.

" Authority " means (*a*) any licence issued by the Secretary of State under Sect. 12 of the principal Act, (*b*) any authority granted by the Secretary of State under that Section and (*c*) any general authorisation; and the expression ' Authorised' shall be construed accordingly.

" Drug " means any drug to which Part III. of the principal Act applies, other than benzoyl-morphine or a preparation, admixture, extract or other substance containing benzoyl-morphine, or a preparation within the meaning of these Regulations:

" Preparation " means any preparation, admixture, extract or other substance containing such a proportion of a drug (other than benzoyl-morphine) as is sufficient to make the preparation, admixture, extract or substance a drug to which Part III of the principal Act applies:

" Principal Act " means the Dangerous Drugs Act 1920, and references to that Act shall be construed as references to that Act as amended by any subsequent enactment or as extended by any Order in Council made under subsection (2) of section eight of that Act.

(2) For the purposes of these Regulations but subject to any limitation attached to his authority: (*a*) a person authorised to manufacture shall be deemed authorised to supply; and (*b*) a person authorised to supply shall be deemed to be a person authorised to be in possession of, to procure, to offer to supply or procure, and to advertise for sale.

18.—These Regulations may be cited as the Dangerous Drugs (Consolidation Regulations, 1928, and shall come into operation Jan. 1, 1929.

The Regulations set out in the Fourth Schedule are repealed: Provided that this repeal shall not affect any order made or any direction or authority given under the said Regulations.

Home Office,
Whitehall.
14th December, 1928.

W. Joynson-Hicks,
One of His Majesty's Principal Secretaries of State.

FIRST SCHEDULE.

Constitution of Reference Tribunal for the purpose of Reg. 7, (3).

Separate tribunals to deal respectively with persons practising in England and Scotland. Consisting, in the case of a medical practitioner, of three medical practitioners, and in the case of a dentist, of three dentists, together with a legal assessor, the members of the tribunal and the legal assessor being appointed by the Secretary of State.

SECOND SCHEDULE.

FORM OF REGISTER.

PART I.—*Drugs or preparations obtained.*

(The class of drugs and preparations to be at the head of each page.)

Date on which received.	Name. / Address. of person from whom obtained.	Amount obtained	Form in which obtained.

PART II.—*Drugs or preparations supplied.*

(The class of drugs and preparations to be at the head of each page.)

Date of transaction.	Name. / Address. of person to whom supplied.	Authority of person to whom article supplied to be in possession thereof.	Amount supplied	Form in which supplied	In case of supply on a prescription, the ingredients of the prescription.

THIRD SCHEDULE.

Exempted preparations.

Cereoli Iodof. et Morph., B.P.C.
Emp. Opii, B.P., 1898.
Lin. Opii, B.P.
Lin. Opii Ammon, B.P.C.
Pasta Arsenicalis, B.P.C.
Pil. Hydrarg. c. Opio, B.P.C.
Pil. Ipecac. c. Scilla, B.P.
Pil. Plumbi c. Opio, B.P.
Pil. Digitalis et Opii Co., B.P.C.
Pil. Hyd. c. Cret. et Opii, B.P.C.
Pulv. Cretæ Aromat. c. Opio, B.P.
Pulv. Ipecac. Co., B.P. (Dover's Powder).
Pulv. Kino Co., B.P.
Suppos. Plumbi Co., B.P.
Tablettæ Plumbi c. Opio, B.P.C.
Ung. Gallæ c. Opio, B.P.
Ung. Gallæ Co., B.P.C.

Added by the Dangerous Drugs (Consolidation) Amendment Regulations, 1931 (S.R. & O., 1931, No. 300) are :—

Elixir Diamorphinæ et Terpini c. Apomorphina, B.P.C.
Linctus Diamorphinæ Camphoratus, B.P.C.
Linctus Diamorphinæ c. Ipecacuanha, B.P.C
Linctus Diamorphinæ et Scillæ, B.P.C.
Linctus Diamorphinæ et Thymi, B.P.C.

These preparations nevertheless come under the Sale of Poisons and Pharmacy Laws.

FOURTH SCHEDULE GIVES LIST OF REGULATIONS REPEALED (1921-1928).

HOSPITAL GENERAL EXEMPTION ORDER, 1924.

By Order dated August 9, 1924, certain hospitals and other institutions are exempted from operation of the Regulations on compliance with certain conditions. This Order substitutes and revokes an Order on the same subject made August 15, 1921. Exempted are :—Any hospital or infirmary, asylum, poor law institution or sanatorium supported by any public authority or out of public funds or by a charity or by voluntary subscription in which the drugs are dispensed by a medical practitioner or a pharmacist or—in a poor law institution—a dispenser whose qualifications and appointment are approved by the Minister of Health if the conditions of Schedule I. (below) are complied with, or, if there is no such dispenser, if the conditions of Schedule II. (below) are complied with.

SCHEDULE I.

1. Orders for supplies must be signed by one of the medical practitioners attached to the hospital, or by the pharmacist.
2. Supplies to be kept in the charge of the person responsible for dispensing, and records to be kept.
3. The medicine only to be dispensed for use of an individual patient, etc.
4 & 5. The person responsible for dispensing the drugs shall at the time of dispensing any prescription stamp, or otherwise mark, the prescription, and shall keep records (to be kept 2 years).
6. Stock preparations in wards or out-patient department shall only be supplied on the requisition of the sister in charge, who shall keep the drugs under lock and key, and only be used by her under medical super- vision.
7. A requisition shall be marked in the dispensary, and filed, and a copy or note of the requisition kept by the sister in charge.
8. Precautions shall be taken to prevent any theft of the drugs.
9. Preparations may be prescribed by any name known in the hospital.
10. Nothing in this Schedule shall affect any medicine or other substance to which the Regulations do not apply.

SCHEDULE II.

Supplies are to be to, or on, the order of, a medical practitioner attached to the hospital (***not the dispenser***), and he must certify that the supply is necessary for the treatment of the patients. The matron is to be responsible for keeping the drugs (in a locked cupboard) and for using or administering them and recording their purchase, but they are only to be used, etc., under the direction of a medical practitioner attached to the hospital. Except so far as the Schedules apply, the Regulations must be observed—for instance the chemist supplying a hospital must record the supplies, get them signed for and mark the packages as on ordinary sales.

NURSING HOMES. The exemption does not apply.

SPECIAL AUTHORISATIONS. (H.O. Aug., 1921.).

Laudanum to Farmers and Stock-owners.

Farmers and stock-owners may, in certain circumstances, be granted by the Chief Officer of Police and authority to obtain Tincture of Opium for treatment of animals from the person specified in their Authority. Purchaser must sign Poisons Book. Not more than 32 fluid ounces may be supplied on each order.

Cocaine in Castor Oil to Factory Occupiers.

(Factory & Workshops Act, 1901.)

P1 A preparation for the treatment of injury to the eyes, consisting of not more than 1 *part of Cocaine in* 200 *of Castor Oil*, with not less than 1 part in 3,000 of Mercuric Chloride, may be sold to the occupier of a factory or workshop to which the Factory and Workshop Act, 1901, applies.

British Steam Fishing Vessels are also authorised to be in possession of this solution under conditions by the Home Office, Dec. 30, 1927.

Preparations of Opium to Midwives.

Preparations **containing Opium** (but not **Morphine tablets**) may be sold to certified and *practising* midwives so far as is necessary for their midwifery practice. They must sign the Poisons Book, and must be introduced if strangers.

STATUTORY RULES AND ORDERS (S.R. & O.), (MAY 20), 1921, No. 864, CONCERNING

RAW OPIUM.

1. No person shall supply or procure, or offer to supply or procure **Raw Opium** to or for any person whether in the United Kingdom or elsewhere, or shall advertise Raw Opium for sale—(*a*) unless licensed or authorised; or (*b*) otherwise than in accord with the terms and conditions of the licence or authority.

2. No person shall supply or procure, or offer to supply or procure Raw Opium to or *for any person who is not licensed* or authorised to be in possession of it.

Possession.

3. No person shall be in possession or attempt to obtain possession of Raw Opium (added by Order of October 2, 1922) unless (*a*) licensed to import or export, or (*b*) licensed or authorised to supply, or (*c*) otherwise licensed or authorised to be in possession of it.

Records.

4. A person who supplies Raw Opium shall (*a*) enter in a register kept for the sole purpose all supplies purchased or obtained and all dealings effected (including sales or supplies to persons outside the U.K.) as shown in the schedule; (*b*) make entry with respect to purchases on the day it is received and with respect to sales or supplies by him on the day on which the transaction is effected; or if not reasonably convenient on the day following; (*c*) if he carries on business at more than one address keep a separate register for each set of premises; (*d*) keep the register available for inspection; (*e*) not cancel, obliterate or alter any entry or make any untrue entry. Any mistake in an entry may be corrected by a marginal note or footnote giving the correct particulars and dated.

The registers are to be kept 2 years from date of last entry (S.R. & O., OCT. 2 1922, No. 1086).

General Authorisations are provided.

Delivery to Messengers.

7. Delivery shall not be made to a person not licensed or authorised to be in possession who *purports to be sent* by or *on behalf* of a licensed or authorised person unless he produces an authority in writing, signed by the person licensed or authorised to receive it on his behalf and unless the person supplying is satisfied that the authority is genuine. (In the case of Raw Opium there is ***no exemption*** for prescriptions.)

"*Possession.*"

8. Raw Opium in the order or disposition of anyone is in his possession.

Application to Ireland.

9. As under Section 16 (*a*) of the Act, *q.v.*

S.R. & O., MARCH 28, 1922, No. 298.

Concerning Marking Raw Opium for Export.

Packages for export otherwise than by parcel post, shall be marked on one side and on top with lettering at least two inches in height, with the words "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border at least one-half of an inch in width.

Packages sent by parcel post shall be marked in conspicuous and indelible block lettering with the words, "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border.

The marking shall be on the package itself, and not on a label, or ticket, or other thing attached thereto. No words, letters or figures, except those prescribed shall be placed within the rectangular border.

S.R. & O., OCT. 2, 1922, No. 1086.

1. Regulation 3 of the Regulations of 20th May, 1921 (S.R. & O. 1921, No. 864) amended. We have made the addition.

2. The registers to be kept for two years from the date of the last entry.

See also S.R. & O. 1923, No. 311; 1924, No. 1292 (Diversion of Raw Opium in transit).

DANGEROUS DRUGS BILL, 1932.—The object of the Bill is to enable the Government to ratify the International Convention of 1931 to restrict the manufacture of dangerous drugs, including Codeine and Dionine. It is stated that a large illicit trade in Morphine is conducted in the Far East, and the trade has been concealed by the manufacturers stating that the Morphine has been ***converted into Codeine—when such is not the case.*** The new Bill will not ***alter the existing Regulations in respect of the supply of Codeine and Dionine*** by retail or to patients in a hospital. Sir Malcolm Delevigne said the Bill would not hamper the Medical Profession. or hinder genuine scientific research, but will, it is hoped, effectively curtail illicit practices.—B.M.J. Suppt. i./32,79; P.J. i./32,214; C.D. i./32,308.

MORPHINE ADDICTS.

Morphine addicts are defined as persons who, not requiring the continued use of a drug for relief of symptoms of organic disease, have acquired, as a result of repeated administration, an overpowering desire for its continuance and in whom withdrawal of the drug leads to definite symptoms of mental or physical distress or disorder. No obligation to keep record of morphine or other drugs if *prescribed* or *personally administered.*—From Departmental Committee Report on Morphine and Heroin Addiction 1926.—B.M.J. i./26,814.

Numerous suggestions as precautions in treatment of Addicts were made There is danger with regard to ***'Chlorodyne,'*** see pp. 287, 561.

It was reported there is no present need for the prevention of addiction. to lower the limit of morphine content now fixed (0·2%). The position as regards chlorodyne might be met if it could be secured in some way that no preparation should be sold under the name of 'Chlorodyne' which contained more than 0·1 per cent. of morphine.

Historical Evolution of the Acts. In cases of infringement it was recommended that medical men should be dealt with by a specially constituted Tribunal instead of the Courts. At the Second Opium Conference (Feb. 1925) of the League of Nations recommendations that *all* preparations containing Heroin and the Cannabis preparations were to be placed under the D.D.A. were made. These are not yet legalised.—Sir W. Willcox, P.J. i./26,507.

The **Veronal group** commonly leads to addiction. They produce cerebral symptoms and an abnormal mental condition. Should only be supplied on medical prescription and the prescription should be retained, *i.e.*, Sects. 5 and 6 of the 1921 Regulations should apply.—Sir W. Willcox, P.J. i./26,508.

References to the Dangerous Drugs Regulations.

The passage of the Dangerous Drugs Act, 1920, endeavoured to give legislative effect, so far as Great Britain was concerned to the obligations incurred under the International Opium Convention signed at the Hague 1912. An Advisory Committee was appointed by the Council of the League of Nations. Smuggling widely prevalent.—L. i./21,919 ; B.M.J. ii./21,329.

Analysis of 185,000 Insurance Prescriptions in Scotland, May, 1922. Opium *per se* or in various forms of admixtures occurred 13,587 times (7·3%) ; total quantity 11¼ lbs. Cocaine in various forms 347 times (0·18%) ; total quantity 1043·57 grains. Morphine 10,690 times (5·7%). Demonstrative proof of the comparatively small use of narcotic drugs in medicine, and of the rarity of preparations containing 0·2% Morphine or Diamorphine, or 0·1% Cocaine.—P.J. ii./22,285.

COCAINE DENTAL ANÆSTHETICS. In view of the Dentists Act 1921, the authority under the Dangerous Drugs Act, 1920, to certain *un*registered dental practitioners to purchase dental anæsthetics containing Cocaine, was withdrawn Nov. 30, 1922.

The penalties in regard to offences under the D.D. Acts are ridiculously excessive. Dangerous Drugs should only be supplied on medical prescription and should not be dispensed by a medical practitioner except in cases of emergency.—Sir W. Willcox, P.J. i./26,544, D.D. Acts, ' their Application by the Physician and the Pharmacist.' *Ibid.* 507,522. There are definite financial sacrifices in respect of trading in which the pharmacist has had long-standing rights.—*See also* L. i./26,1071.

Kingsbury case. Appeal allowed with costs. He did not ' supply '—had in fact given the patient only sufficient doses of the drug to last until his next visit. An important point concerning ' administration under direct personal supervision,' etc.—B.M.J. ii./26,948.

A legally qualified medical practitioner must—under the Medical Act 1858—be registered. D.D. prosecution, B.M.J. i./27,819.

For a medical man to have to write the quantity of Morphine or Cocaine is contrary to the strict privacy of a medical prescription.—W. G. McNab, Exec. Meeting, N. British Branch Pharm. Socty, July, 1926.

A summons against Mr. R. L. Dillon, charged with obtaining Morphine simultaneously from two doctors without disclosing to either that he was being treated by the other, was dismissed. There had been no concurrent treatment.—L. i./28,1296.

Prosecution and conviction (5 months in Second Division) re scrips for 8 grains of Heroin.—B.M.J. i./30,53.

An addict, an unauthorised medical man, in possession of 11 grains of Morphine Sulphate, bound over in the sum of £100.—P.J. ii./30,417.

Veterinary Surgeon case at Southampton : irregularities ; dismissed.—P.J. ii./30,417,475.

An Appeal (Liverpool) against a conviction that Register was not available for inspection. Police Inspector called to see it while manager in charge of shop out at lunch and book locked up. Someone should be in charge to produce it. Appeal dismissed.—P.J. ii./30,576,590.

D.D.A. Wholesale Druggist Sundries firm paid 15s. fine and 5 guineas costs. Dangerous Drugs in an unlocked desk ; four girls working in the office.—P.J. ii./30,522.

British Govt. Report 1929 to League of Nations makes it clear that 'Drug addiction is not prevalent in this country.' 70 persons were proceeded against in 1929 under the Act—34 imprisoned, 26 fined, and a few deported.—B.M.J. ii./30,167.

D.D. Act 1920 re Manufacture, Sale, etc., of Benzoyl-Morphine.—P.J. ii./28,528.

D.D. (Consolidated) Regulations 1928 as to retail sale to the public of Coca leaves and preparations containing less than 0·1% of Heroin effective from Jan. 1, 1929.—P.J. ii./28,604.

Further References to cases in 1928. *See Vol. II., Edn. XIX, p.* 68.

POINTS OF ASSISTANCE.

The Home Office has issued a third edition of its memorandum on the duties of doctors and dentists in respect of the Dangerous Drugs Acts and Regulations. Unquestionably the law is complicated and increases the cares of the practitioner, but the Home Office has reasonably met the interests of the Profession in the matter of the Reference Tribunal and the machinery for withdrawing a practitioner's authority under the Acts.—L. i./29,933.

"Signed Orders!" *in Wholesale Dealings re Part I. Poisons.* The intention of the alteration of Section 17 of the Pharmacy Act 1868, is to require signed orders from all persons except retail chemists.—C. D., June 16/23,843.

Wholesale dealing in Dangerous Drugs cannot be conducted without licences. A retail pharmacist can supply the drugs against 'signed orders,' but a pharmacist doing a wholesale and retail trade must apply for licences in respect of the wholesale side of his business. The licences run to about £13 p.a. with 2s. 6d. each for every licence for export.

Points liable to be forgotten in practice are:—

All the drugs covered by the Acts are [P1] Poisons.

Dentists' and veterinary surgeons' (not doctors') prescriptions must have the amount of the drug stated on the label.

N.H.I. prescriptions need not have doctor's address; must *not* be repeated; must be kept as hitherto and sent to Pricing Bureau.

Typewritten prescriptions are accepted as 'written.'

The inclusion of the words "to attempt" to obtain the drugs is to deal with a person who tries to obtain through misrepresentation, even though the chemist discovers the fraud before parting with them.

Doctors may write prescriptions for themselves.

Telephone orders from medical practitioners may be executed, but the written order must follow within 24 hours.

Nursing Homes are not authorised persons.

Public Analysts and Teachers requiring the drugs must sign the Poisons Book.

Persons in charge of a laboratory must prove that the Institution to which it is attached has been approved by the Home Office for Dangerous Drugs Act purposes.—Mallinson.

A **foreign** medical practitioner, unless registered in England (see Medical and Dental Register) is not a medical practitioner under the Act, *cf.* L. ii./29, 1206.

When in doubt—refuse to dispense, if the doctor is not known. The chemist is not legally bound to supply anything.

DANGEROUS DRUGS ACT TABLES.

We have made the following calculations which should be of assistance to Medical Practitioners.

The following, and any quantities of drugs above the following, are within the meaning of the Act.

MIXTURES, INJECTIONS, NEBULÆ (SPRAY SOLUTIONS) and other liquid preparations.

'DRUG.'	PERCENTAGE LIMIT OF 'DRUG' ALLOWED IN A MIXTURE, ETC.	AMOUNT PER FLUID OUNCE.
Morphine (Anhydrous Base)	0·2	$\frac{7}{8}$ grain
,, Acetate	0·28	$1\frac{9}{40}$,,
,, Hydrochloride	0·26	$1\frac{11}{80}$,,
,, Tartrate	0·27	$1\frac{29}{160}$,,
,, Sulphate	0·27	$1\frac{29}{160}$,,
,, Hypophosphite	0·25	$1\frac{3}{32}$,,
Liquor Morphinæ Acetatis B.P.'14	28·0	135 minims
,, ,, Hydrochloridi. B.P.	26·0	125 ,,
,, ,, Tartratis B.P.'14	27·0	130 ,,
Injectio Morphinæ Hypodermica (Tart.) B.P.'14	10·8	52 ,,
Cocaine (Base)	0·1	$\frac{7}{16}$ grain
,, Hydrochloride ... B.P.'14 ...	0·112	$\frac{1}{2}$,,
,, Nitrate	0·12	$\frac{2}{4}\frac{1}{0}$,,
Injectio Cocainæ Hypodermica. B.P.'14	2·24	10 minims
Extractum Cocæ Liquidum (0·5% alkaloids)	20·0	96 ,,
Diamorphine (*Base, i.e.* Diamorphine under the Act)	Nil	Nil
Diamorphine Hydrochloride (Heroin Hydrochloride)	Nil	Nil
Opium Medicinal B.P.'14 (Raw Opium artificially dried containing 10% Anhydrous Morphine)	2·0	$8\frac{3}{4}$ grain
Extractum Opii Liquidum. B.P.'14 (0·75 Anhydrous Morphine)	26·6	128 minims
Extractum Opii Siccum. B.P.'14 ... (20% Anhydrous Morphine)	1·0	$4\frac{3}{8}$ grain
Liquor Opii Sedativus ... ... (1·5% Morphine)	13·3	64 minims
Tinctura Opii (1% Anhydrous Morphine)	20·	96 ,,
Pulvis Opii Compositus B.P.'14 ... (10% Opium)	20·0	$87\frac{1}{2}$ grains
Pulvis Cretæ Aromaticus cum Opio. B.P.'14 ($2\frac{1}{2}$% Opium)	80·0 *Exempted if not admixed with other active ingredients.*	350 ,,
Pulvis Ipecacuanhæ Compositus (10% Opium)	20·0 *Exempted if not admixed with other active ingredients.*	$87\frac{1}{2}$,,
Pulvis Kino Compositus (5% Opium) ...	40·0 *Exempted if not admixed with other active ingredients.*	175 ,,

PILLS AND TABLETS.

'Drug.'	Limit Percentage Allowed.	
Pilula Ipecacuanhæ cum Scilla. B.P. '14 [About 5% Opium (0·5% Morphine)]	40·0 but *exempted* if not admixed with other active ingredient	Irrespective of weight and size of pill or tablet.
Pilula Ipecacuanhæ cum Urginea. B.P. '14 [About 5% Opium]	40·0	
Pilula Plumbi cum Opio. B.P.'14 .. [About 12% Opium (1·2% Morphine)]	16·6 but exemption as above.	
Pilula Saponis Composita. B.P.'14 [About 20% Opium (2% Morphine)]	10·0 *not exempted*	

Limit Amount Allowed in One Grain.

Pilula Morphinæ Hydrochloridi	$\frac{1}{380}$	gr.	**Diamorphine (Base)** ..	$\frac{1}{1000}$	gr.
Pilula Morphinæ Sulphas	$\frac{1}{370}$	,,	**Diamorphine Hydrochloride** ..	$\frac{1}{870}$	,,
Pilula Morpinæ Tartratis ..	$\frac{1}{370}$	,,	**Opium**	$\frac{1}{50}$	,,
Cocaine Base	$\frac{1}{1000}$	,,	**Extractum Opii Siccum**	$\frac{1}{100}$	,,
Cocaine Hydrochloride	$\frac{1}{890}$	,,	**Pulvis Opii Compositus**	$\frac{1}{5}$	,,
Cocaine Nitrate.. ..	$\frac{1}{830}$	,,	**Pulvis Ipecacuanha Compositus** ..	$\frac{1}{5}$	,,
Extractum Cocæ (Solid) 2% alkaloids	$\frac{1}{20}$	,,	**Pulvis Kino Compositus**	$\frac{2}{5}$	,,

LOZENGES.

Generally made to weigh 20 grains.

'Drug.'	Limited Amount allowed in Lozenges.	
Morphine Hydrochloride..	$\frac{1}{19}$ grain	..[The B.P. '14
Cocaine Hydrochloride	$\frac{1}{45}$,,	..Troch. Morphinæ
Diamorphine (Base)	nil.	.. ($\frac{1}{32}$ grain) are
Diamorphine Hydrochloride	nil.	..therefore outside
Opium..	$\frac{2}{5}$ grain	.. the Act.]
Extractum Opii Siccum	$\frac{1}{5}$,,	..
Trochiscus Krameriæ et Cocainæ—*cf.* **Cocaine Hydrochlor.** above.		

LINIMENTS AND LOTIONS.

'Drug.'	Limit Percentage Allowed.	Amount per Fluid Ounce.
Linimentum Opii. B.P.'14 (0·5% Morphine)	.. 40·0 (Exempted if not admixed with other active ingredients.)	192 minims
Tinctura Opii .. .. (in a liniment or lotion)	.. 20·0	96 ,,
Oleatum Morphinæ (1 in 60)	.. 12·0	58 ,,

SUPPOSITORIES, PESSARIES, OVULES AND TAMPONS.

'Drug.'	Limit Amount Allowed.
Morphine Hydrochloride..	$\frac{13}{40}$ grain in 125 grains, or $\frac{1}{25}$ gr. in 15 grains
Cocaine (Base)	$\frac{1}{4}$ „ „ 250 „ „ $\frac{3}{200}$ „ 15 „
Cocaine Hydrochloride ..	$\frac{7}{25}$ „ „ 250 „ „ $\frac{1}{60}$ „ 15 „
Extractum Cocæ .. .. (2% alkaloids)	$12\frac{1}{2}$ „ „ 250 „ „ $\frac{3}{4}$ „ 15 „
Diamorphine (Base) ..	None allowed.
Diamorphine Hydrochlor.	„ „
Opium. B.P.'14	5 grains in 250 grains, or $\frac{3}{10}$ gr. in 15 grains
Plumbi Composita. B.P.'14	The *Off.* Suppositories are *exempted.*
Extractum Opii. B.P.'14	$2\frac{1}{2}$ grains in 250 grains or $\frac{3}{20}$ grain in 15 grains

BOUGIES.

$2\frac{1}{2}$ inches made with Oleum Theobromatis weigh 20 grains.
$2\frac{1}{2}$ „ „ „ Bougie Mass weigh 25 grains.
4 „ „ „ Oleum Theobromatis weigh 40 grains.
4 „ „ „ Bougie Mass weigh 50 grains.

'Drug.'	Limit Amount.
Morphine Hydrochloride..	$\frac{1}{19}$ grain in 20 grains ($\frac{1}{15}$ in 25, $\frac{2}{19}$ in 40, $\frac{2}{15}$ in 50 grains).
Cocaine Hydrochloride ..	$\frac{1}{45}$ „ „ 20 „ ($\frac{1}{36}$ in 25, $\frac{2}{45}$ in 40, $\frac{1}{18}$ in 50 grains).
Opium. B.P.'14	$\frac{2}{5}$ „ „ 20 „ ($\frac{1}{2}$ in 25, $\frac{4}{5}$ in 40, 1 in 50 grains).

OINTMENTS, PASTES, ETC.

'Drug.'	Limit Percentage Allowed.	Amount Per Ounce (Avoir.).
Morphine (Anhydrous Base)	0·2	$\frac{7}{8}$ grain
Morphine Hydrochloride	0·26	$1\frac{11}{80}$ „
Cocaine (Base)	0·1	$\frac{7}{16}$ „
Cocaine Hydrochloride	0·112	$\frac{1}{2}$ „
Unguentum Gallæ cum Opio. B.P.'14	Exempted.	
Opium	2·0	$8\frac{3}{4}$ „
Extractum Opii Siccum	1·0	$4\frac{3}{8}$ „

EXAMPLES OF ℞ PRESCRIPTIONS.

Note: According to the *D.D. Regulations if B.P. or B.P.C. or N.H.I.* prepns. are used solely in a prescription it suffices to state the amount of the 'Dangerous' *preparation.* Otherwise calculation must be made as in the instance of Trochisci Menthol et Heroin, p. 1013.

The name and address of patient and the **date** *and the medical practitioner's usual signature and* **his address must** *appear on every prescription.*

℞

Morphine ... ... $\frac{1}{30}$ grain
Sodium Bicarbonate ... ... 8 grains
Magnesium Carbonate ... ... 7 grains
Fiat pulv. 1, *mitte tales* 60. *Sig.* 1 *t.d.s.*
Total amount of Morphine 2 grains.

To be repeated on July 21*st*, 1933, *and on August* 11*th*, 1933, *only.*

R. Mason, M.D.,
317, Harley Street, London, W.1.

The qualifications need not actually be stated.

℞

Liquid Extract of Opium ... 2 ounces
Extract of Belladonna ... ... $\frac{1}{2}$ ounce
Glycerin to ... ... 6 ounces
Sig. To be applied on lint 2 or 3 times a day.
Total amount of Liquid Extract of Opium 2 ounces.

℞

Ext. Cocæ Liq. ... ... 1 drachm
Syl Vanillæ ... ... 1 drachm
Elix. Saccharin ... ... 5 minims
Aq. ad ... ... $\frac{1}{2}$ ounce
Send 16 ounces. *Sig. Coch. mag. p.r.n.*
Total Coca Alkaloids, $8\frac{3}{4}$ grains.

To be repeated on July 21*st*, 1933, *and August* 11*th*, 1933, *only.*

℞

Cocaine Hydrochloride ... ... $\frac{1}{2}$%
Menthol ... ... $2\frac{1}{2}$%
White Soft Paraffin ... ... *q.s.*
Send 4 drachms. *Sig.* The ointment for the nose.
Total Cocaine Hydrochloride, $1\frac{1}{3}$ grains.

℞

Morphine Hydrochloride ... $\frac{1}{2}$ grain
Theobroma Oil to ... ... 15 grains
M. ft. Suppos. 1; *mitte* 36.
Total Morphine Hydrochloride, 18 grains.

℞

Pulv. Cretæ Aromat. c. Opio ... 10 grains
Ext. Nucis Vom. ... ... $\frac{1}{8}$ grain
Misce et fiat Slipule i. Mitte XII.
Sig. 1. to be taken thrice daily between meals.
Total amount of Pulv. Cretæ Aromat. c. Opio. 120 grains.

℞

Injectio Morphinæ Hypodermica, B.P. 10 Cc.
Fiant ampullæ XX. Sig. i. s.o.s.
Total amount of Inj. Morph. Hyp. 10 Cc.

℞

Pulv. Opii ... ... 3·75 Gm.
Pulv. Gallæ ... ... 12·5 Gm.
Ung. Hamamelidis ad ... 50·0 Gm.
Fiat unguentum. Sig. m.d.a.
Total Opium Content, 3·75 Gm.

℞

Cocaine Hydrochloride ... ... $\frac{1}{10}$ grain
Morphine Hydrochloride ... $\frac{1}{5}$ grain
Fiat aurinarium; mitte 20. *Sig.* One to be inserted when the pain is severe.
Total Cocaine Hydrochloride, 2 grains. Total Morphine Hydrochloride 4 grains.

℞

Cocaine Hydrochloride ... ... ½ grain
Theobroma Oil ... ... *q.s.*
Fiat bougie 1.—4 ins. in length ; *mitte XII.* *Sig.* To be used as directed.
Total Cocaine Hydrochloride, 6 grains.

℞

Resorcin ... ... 40 grains
Solution of Cocaine Hydrochloride, ½% to 4 ounces.
Sig. To be used in nasal spray 3 or 4 times a day.
Total Cocaine Hydrochloride, 8¾ grains.

℞

Morphine Bimeconate ... ... ⅛ grain
Butyl Chloral Hydrate ... ... 3 grains
Gelseminine Hydrochloride ... $\frac{1}{200}$ grain
Fiat pilula, mitte 8. *Sig.* 1 every half hour until 4 pills are taken and then every hour for 4 hours.
Total Morphine Bimeconate, 1 grain.

℞

Trochisci Menthol c. Heroin, $\frac{1}{12}$th grain, 1 ounce.
Sig. Take one for cough.
Total Heroin Hydrochloride, 1⅔ grains.

℞

Cocaine Hydrochloride ... ... ½ grain
Adrenalin... ... ... $\frac{1}{500}$ grain
Glycogelatin basis ... ... *q.s.*
Fiat ovule i. Mitte XII. Sig. m.d.u.
Total Cocaine Hydrochloride,... 6 grains

℞

Tinct. Opii ... ...
Acid Sulph. Aromat. ... ... *aa* 2 drachms
M. ft. guttæ. Sig. Guttæ viginti ex aqua quotidie sumendæ.
Total amount of Tinct. Opii 2 drachms.

EXAMPLE OF DENTIST'S PRESCRIPTION.

Name and address of the patient.

℞

Cocaine Hydrochloride ... ... 10 grains
Adrenalin Solution ... ... 10 minims
Distilled Water to ... ... ½ ounce
Total Cocaine Hydrochloride, 10 grains.
(*Dispenser must state this on label.*)
Apply with a pledget of wool to the part occasionally.

FOR LOCAL DENTAL TREATMENT ONLY.

To be repeated at intervals specified.
(*Usual signature, date and address.*)

EXAMPLE OF VETERINARY SURGEON'S PRESCRIPTION.

Name and address of
Owner of dog.

℞

Opium in powder ... ... 20 grains
Sulphur Ointment to ... ... 1 ounce
Total Opium content, 20 grains.
(*Dispenser must state this on label.*)
For the dog.

FOR ANIMAL TREATMENT ONLY.

(*Usual signature, date and address.*)

EXAMPLE OF 'SIGNED ORDER.'

By Medical Man complying with 1923 Act
for ***postal transmission of* [P1] *Poisons in general***
(whether Dangerous Drugs or not).

Please send me (by *Registered* Post) :—
Opium Medicinal in powder, 4 ounces.
Ext. Cocæ Liq., 1 lb.
Morphine Hypophosphite, 1 ounce.
Diamorphine Tablets, $\frac{1}{10}$ grain, 100.
Liq. Strych. HCl., 4 ounces.
Ext. Nucis Vom. Liq., $\frac{1}{2}$ lb.
(*Usual signature and address*).

SIMILAR SIGNED ORDERS SHOULD BE GIVEN BY A DENTIST OR VETERINARY SURGEON.

Caution.—The requirements of the Act are ***in addition*** to the provisions of Sect. 17 Phcy. Act 1868. The purchaser must ***be known to the seller*** or be ***introduced.*** Failing this, the pharmacist should refuse to supply.

VENEREAL DISEASE ACT, 1917,

An Act to prevent the treatment of Venereal Disease (syphilis, gonorrhœa or soft chancre) otherwise than by ***duly qualified medical Practitioners,*** and to control the supply of Remedies therefor. The following is a résumé :—

1.—(1) In any area in which this section is in operation, a person shall not, ***unless he is a duly qualified medical practitioner,*** for reward either direct or indirect, ***treat any person for venereal disease*** or prescribe any remedy therefor, or give any advice in connection with the treatment thereof whether the advice is given to the person to be treated or to any other person.

(2) This section shall operate in any area to which it is applied by order of the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively :

Provided that no order shall be made in respect of any area until a scheme for the gratuitous treatment of persons in that area suffering from venereal disease has been approved by the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively, and is already in operation.

2.—(1) A person shall ***not*** by any advertisement ***treat or offer to treat any person for venereal disease,*** or prescribe or offer to prescribe any remedy therefor, or offer to give or give any advice in connection with the treatment thereof.

(2) On and after the first day of November, 1917, a person shall not recommend to the public by any notice or advertisement, or by any label or words written or printed, affixed to or delivered with, any packet, box, bottle, phial, or other inclosure containing the same, any pills, capsules, powders, lozenges, tinctures, potions, cordials, electuaries, plaisters, unguents, salves, ointments, drops, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever, to be used or applied externally or internally as medicines for the prevention, cure, or relief of any venereal disease :

Provided that nothing in this section shall apply to any advertisement made by any local or public authority or made with the sanction of the Local Government Board, or in Scotland and Ireland the Local Government Board for Scotland and Ireland respectively, or to any publication sent only to duly qualified medical practitioners or to wholesale or retail chemists for the purposes of their business.

3.—Penalties : Imprisonment, with or without hard labour, for not exceeding two years, or on summary conviction to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding six months.

National Council for Combating Venereal Disease. Meeting at Edinburgh Resolutions.—L. i./19,352.

DENTISTS ACT, 1921.

Came into force November 30th, 1922. ***Expressly restricts practice of dentistry to registered dental practitioners.*** Under the Act about 8,000 hitherto unregistered dental practitioners were added to the Dentists Register.

No person can now enter the dental profession without going through the dental curriculum and obtaining a diploma or degree. Exceptions are in the cases of registered medical practitioners, registered pharmacists and minor dental work in a public service under conditions approved by the Ministry of Health.

Regulations adopted by the newly constituted Dental Board (obtainable from the office of the Board), 44, Hallam Street, W., post free 2s. 8d.), deal *inter alia* with the keeping of the Register. Persons registered under the new Act include those in practice for 5 of the 7 years prior to July 28, 1921 ; members of the Incorporated Dental Society and pharmacists who applied for registration showing that immediately prior to that date they had a substantial practice in dentistry.—Refs. : B.M.J. Supp. i./22,19 ; B.M.J. ii./22, 283, 894, 1099, 1113, 1199 ; P.J. ii./22,527.

THERAPEUTIC SUBSTANCES ACT, 1925.

(15 & 16 *Geo.* 5., *Ch.* 60.)

An Act to provide for the regulation of the manufacture, sale, and importation of vaccines, sera, and other therapeutic substances, (*7th August,* 1925.)

1. This Act applies to :

(1) ***Vaccines, sera, toxins, antitoxins and antigens.***

(2) ***Salvarsan*** (Dioxy-diamino-arseno-benzol-di-hydrochloride) and analogous substances used for the specific treatment of infective diseases.

(3) Preparations of the specific antidiabetic principle of the pancreas known as ***insulin.***

(4) Preparations of the ***posterior lobe of the pituitary body*** intended for use by injection.

and any other therapeutic substances, afterwards called ' substance,' which may from time to time be added as being substances the purity or potency of which cannot be adequately tested by chemical means.

2.—(1) To manufacture for sale any substance to which this Act applies a licence from the licensing authority is required.

(2) The licence continues in force for such period as may be prescribed (2 years), but may from time to time be renewed for a like period.

(3) The conditions under which the substances are manufactured, and the premises, must satisfy the licensing authority.

(4) A licence may be revoked or suspended if the licensee fails to comply with the requirements.

(5) This section does not apply to the preparation by a medical practitioner for any of his own patients or for and at the request of another practitioner, if specially prepared with reference to the condition, and for the use, of an individual patient.

3.—(1) Importation into Great Britain or Northern Ireland necessitates standards of strength, quality and purity, and the substance is to be consigned to a person licensed by the licensing authority to import ; or to a person engaged in scientific research holding a special licence to import.

(3) Substances prohibited come under Section 42 of the Customs Consolidation Act, 1876, and any Act amending or extending.

4.—(1) Joint Advisory Committees frame regulations.

5.—(1) The joint committee has power to make regulations for prescribing standards, tests, adding to the Schedule, prescribing the forms of licences, including inspection of premises and plant, and to take samples, and to exclude any substance used solely for veterinary purposes. If advertised or sold as a proprietary medicine or contained in such medicine, such accepted scientific name, or name descriptive

of the true nature and origin of the substance, as may be prescribed shall appear on the label. Date of manufacture shall be stated on all vessels or packages, and the sale is prohibited after the expiry of the prescribed period.

6.—Contravention of the Act renders a person liable on summary conviction to a fine not exceeding £100, and on second or subsequent convictions to a fine and imprisonment with or without hard labour for not exceeding 3 months, and in either case goods to be forfeited and licence may be revoked or suspended.

7.—(1) The licensing authorities are for England and Wales, the Minister of Health : for Scotland, the Scottish Board of Health : for Northern Ireland, the Minister of Home Affairs for Northern Ireland.

THERAPEUTIC SUBSTANCES REGULATIONS 1931, No. 633.

PART I. *Interpretation, etc.*

Addition of sterilized surgical ligature and suture to the 1925 Act.

PART II. *Licences for Manufacture of Therapeutic Substances.*

6.—Applicant to satisfy the licensing authority that upon issue or renewal of licence the conditions set out in No. 7 of the Regulations will be observed.

7.—(*a*) Concerns provision of adequate staff and premises for manufacture.
(*b*) And for tests of the strength, quality and purity of the substance including housing for animals used, the licensee shall maintain staff and premises to carry out tests or make arrangements with some institution approved for such tests to be regularly carried out on his behalf.
(*c*) Records of manufacture and tests to be kept with batch-number.
(*d*) Inspectors may inspect the premises and plant and the process of manufacture and the means employed for standardising and testing and may take samples.
(*e*) Any changes in the expert staff responsible and in the premises or plant to be reported.
(*f*) Samples to be furnished on request.
(*g* & *h*) Batches may be withheld from sale.
(*i*) Licensee to comply with Parts III. and IV. and further requirements if necessary.

PART III. *Provisions with regard to names of substances and to containers, etc.*

8.—If any substance is advertised or sold as a proprietary medicine or is contained in a medicine the ' proper name ' of the substance shall appear on the label in the manner prescribed in this Part of these Regulations.

9.—The substance is to be sealed in a previously sterilised glass container. (Ligatures and sutures may be in containers other than glass.)

10.—(1) *Labelling.* The following are required :—
(*a*) The proper name of the substance in letters not less conspicuous than those in which the proprietary name, if any, is written or printed, and following immediately after or under such proprietary name.
(*b*) The number of the licence under which the substance is manufactured preceded in the case of Import licenses by the words ' Import License.'
(*c*) A distinctive batch number.
(*d*) The name and address of the maker, date of manufacture, and statements of toxicity if required, nature of antiseptic if any, are also enforced, also date of removal from cold storage at a temperature not exceeding 5° C.

11.—The sale of a substance after prescribed date is prohibited, but a practitioner may override this, if his attention has been drawn to the date and he is satisfied it is required by the urgency of the case.

PART IV. *Standards of strength, quality and purity, and tests for determining.*

15.—Tests for living aerobic or anaerobic bacteria are to be made in the case of :—

(*a*) Sera and solutions of serum proteins for injection.
(*b*) Certain bacterial vaccines.
(*c*) Toxins, antigens, and mixtures of toxins or antigens with serum.
(*d*) Solutions of insulin.
(*e*) Dry preparations of insulin intended for therapeutic use.
(*f*) Preparations of the posterior lobe of the pituitary body.

16.—The tests are to be applied :—

(*a*) To samples taken from each batch of the substance before filling and sealing the containers : and
(*b*) To the contents of sample containers when ready for issue.

17.—(*a*) In the case of samples taken from the batch at the time when the test is made, the quantity taken for test shall be not less than 0·1% of the total volume of the batch if the volume is not more than 10 litres, and not less than 10 Cc. if the volume is 10 litres or more, but shall in no case be less than 1 Cc. if the batch is contained in a number of bulk containers, samples in these proportions shall be taken from each of such bulk containers and separately tested.

(*b*) In the case of the contents of sample containers, the number shall be not less than 1% of the total filled from the batch, if this number is not more than 1,000, and not less than 10 if the total number is more than 1,000.

18.—Defines method of preparing and using media.

19.—(1) In the case of samples taken from the batch one-half of the total volume of the sample is to be used for aerobic and one-half for the anaerobic test.

(2) In the case of the contents of sample containers, the contents of each container shall be tested for aerobic and anaerobic organisms. When the volume in each container is 2 Cc. or more the contents shall be divided into two approximately equal parts, one for the aerobic and the other for the anaerobic test.

(3) The inoculated tubes shall be incubated at 37° C. for *seven days* and examined after incubation, permanent records being kept of such examination of each tube.

20.—(1) If at this examination no growth is visible in any tube, the sample has passed the test.

(2) If at the examination a growth is visible, further samples may be taken and the tests repeated. The taking of samples from the batch may, if necessary, be repeated twice, if the same organism is visible in more than one test, the batch shall be treated as not sterile and the material contained in the batch shall not be issued or used as part of a further batch unless and until it has been re-sterilised and has passed the tests.

21.—Emergency Regulations.

22.—Freedom from abnormal toxicity is ensured by injecting 0.5 Cc. of the serum into a normal mouse.

PART V. *Licences for Import of Substances.*

23 and 24.—Broadly, the applicant must furnish a written undertaking signed by, or on behalf of, the manufacturer that the manufacturer will comply with the Regulations as to manufacture and testing.

PART VI.—25. *Research Licences.*—Special modifications apply.

PART VII.—26. *Substances Manufactured or Imported for Export only.* The licensing authority may dispense with any of the requirements of the Regulations, if necessary.

PART VIII. *Substances for Veterinary Use only.*

27.—Containers to be marked 'to be used solely for veterinary purposes.' In respect of ligatures and sutures the labelling of wrapper affixed to package in which the container is issued, suffices.

FIRST SCHEDULE provides forms of application for licences.

SECOND SCHEDULE PART I. Vaccines, toxins, antigens, sera and antitoxins.

(A) Provisions applicable to the production of Bacterial Vaccines.

(2) Defines a bacterial vaccine.

(3) The proper name of a vaccine is the name of the micro-organism followed by the word 'vaccine,' except in the following:

Anti-typhoid vaccine, Anti-typhoid-paratyphoid vaccine (T.A.B.), Anti-typhoid-paratyphoid-cholera vaccine (T.A.B.C.), Anti-plague vaccine, Whooping cough vaccine, Anti-dysentery vaccine.

(6) The label on the container must indicate composition:—

(*a*) Number of micro-organisms per Cc. or

(*b*) Weight of dried substance of micro-organisms per Cc. or

(*c*) Number of micro-organisms or weight of dried substance of organisms used in preparing 1 Cc. of the finished product.

(B) Special provisions *re* **Vaccine Lymph** (Vaccinia).

(1) The proper name is 'Vaccine Lymph.'

Staff of Establishment, Housing of animals, Precautions to observe are dealt with Glycerination and cold storage, tests of gas-producing anaerobic organisms, living hæmolytic streptococci and potency are included.

PART II. Toxins and antigens.

(A) Provisions applicable to reagents used in the **Schick Test** for the diagnosis of susceptibility to diphtheria.

1.—(1) The reagents used in the Schick Test are two, Schick Toxin and Schick Control. Their proper names respectively are 'Schick Test Toxin' and 'Schick Control.'

(2) Schick Toxin is a sterile filtrate from a culture on nutrient broth of the specific organism of diphtheria (*Corynebacterium diphtheriæ*). It may be issued either (i) undiluted, or (ii) already diluted with saline solution to the strength proper for use in the test.

(3) Schick Control is prepared from the same batch of Schick Toxin as that with which it is issued for sale, by destroying the specific toxicity at 70° C. for a time not shorter than 5 minutes.

2.—Tests for Potency.

(B) Provisions *re* **Diphtheria Prophylactic.**

(C) Provisions *re* **Tuberculins** and other preparations from the Bacillus tuberculosis and its cultures.

PART III. Provisions *re* production of all sera from living animals.

PART IV. Provisions *re* particular sera and antitoxins.

(A) Anti-Bacterial Sera and Antitoxic Sera for which no potency test is prescribed.

(B) **Anti-dysentery serum** (Shiga) and other anti-dysentery sera.

(C) **Diphtheria antitoxin** (proper name).

(D) **Tetanus antitoxin** (proper name).

(E) **Gas-gangrene antitoxin** (Perfringens).

THIRD SCHEDULE. Arsphenamine and derivatives.

PART I. Re Arsphenamine and derivatives.

The standard preparations are kept in the National Institute for Medical Research, Hampstead. Biological tests are applied and tests for maximum toxicity and for therapeutic potency.

PART II. Special provisions *re* Arsphenamine. Chemical and physical.

PART III. Special provisions *re* Neo-arsphenamine.

PARTS IV. and V. Special provisions *re* Sulpharsphenamine and other derivatives.

FOURTH SCHEDULE. Insulin:—Proper name. Special conditions of licence. Standard. Units. Quality. Tests. Container. Label.

FIFTH SCHEDULE. Pituitary (Posterior Lobe) Extract:—Proper name. Standard Preparation. Unit of standardisation. Quality. Tests and Label.

SIXTH SCHEDULE. Sterilized Surgical Ligature and Surgical Suture. Tests for Sterility and Labelling. Refs. B.M.J. Supp. ii./25,105; P.J. ii./25,286; P.J. i./31,542.

MERCHANDISE MARKS ACT, 1926.

This Act renders it illegal to sell (Wholesale or Retail), or to expose for sale (Retail) in the U.K. imported goods with label, etc., which is, or might be taken to be, the name or Trade Mark of a manufacturer, dealer or trader, or the name of a place in this country, unless there is an indication of foreign origin, *e.g.*, 'Made in Germany,' or 'Empire.' Two Orders in Council have been made as to *exemptions*, one relative to Petroleum and liquid products thereof, and the other to *uncompounded drugs which are sold for medicinal purposes*, provided they are *not under a proprietary name*. Other Orders referred to Gold and Silver Leaf, Glue and Gelatin, Tooth Brushes, Honey, Cotton Wool, Rubber Goods, Scientific Glassware, and so on.

IMPORT DUTIES ACT, 1932.

(29th Feb., 1932.)

22 Geo. 5, Ch. 8.

An Act to provide for a general *ad valorem* duty on goods produced or manufactured in a foreign country, discriminating in the case of goods produced or manufactured within the Empire, and exempting goods already chargeable with duty under other enactments and goods specified in the First Schedule.

Provision is made for setting up an Import Duties Advisory Committee for the purpose of giving advice and assistance to the Treasury, and for recommending additional duties or the discontinuance of duties.

The Act does not take effect in respect of Empire goods until November 15, 1932, or some later date fixed by Parliament, and neither the general *ad valorem* duty nor any additional duty is chargeable in respect of Empire produce.

In the case of discrimination on the part of any foreign country, by means of imposition of duties or prohibition or restriction of imports, on British or Empire goods, the Board of Trade is empowered to impose supplementary duties on goods imported from that country.

Goods imported with a view to re-exportation are exempt.

FIRST SCHEDULE.

The following are amongst the goods exempted:

Gold and silver, platinum, wheat and maize in grain, meat but excluding extracts in airtight containers, whale oil, cotton, flax, hemp, cotton seed, rape seed, and linseed, newspapers, newsprint, wood pulp, esparto, metallic ores, iron pyrites, unwrought copper, sulphur, phosphates of lime, potassium carbonate, chloride and sulphate, mineral potassium fertilisers, cinchona bark, radium, scientific films, soya beans and cork.

THIRD SCHEDULE.

Goods are not deemed as having been manufactured in the British Empire unless a proportion of their value (S.R. & O. 1932, No. 85) is derived from material grown or produced in the Empire. In the case of goods manufactured from material not wholly grown or produced in the Empire, only such proportion of their value as corresponds to the proportion of Empire material is free of duty. Goods manufactured in a bonded factory in the U.K. from dutiable material of Empire origin are free from duty.

Customs.

Imperial Preference.

(S.R. & O. 1932, No. 85.)

To be cited as the Import Duties (Imperial Preference) No. 1 Regulations 1932. Dated March 1st, 1932.

Goods shall not be deemed Empire produce unless at least 25% of their value is derived from materials grown or produced or from work done in the British Empire.

TRADE MARKS.

The **1905 Trade Marks Act** defined a Trade Mark as follows :—

"A trade-mark shall mean a mark used, or proposed to be used, upon or in connection with, goods for the purpose of indicating that they are the goods of the proprietor of such trade-mark by virtue of manufacture, selection, certification, dealing with, or offering for sale."

It is important to realise that Trade Marks can exist as **Common Law Trade Marks.** An unregistered trade mark can be protected by a "passing off" action, *i.e.*, for an injunction and damages.

A trade mark must contain or consist of at least one of the following essential particulars :

(1) The name of a company, individual, or firm represented in a special or particular manner.

(2) The signature of the applicant for registration or some predecessor in his business.

(3) An invented word or invented words.

(4) A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or a surname.

(5) Any other distinctive mark. But a name, signature, or word or words, other than such as fall within the descriptions in the above paragraphs (1), (2), (3), and (4), shall not, except by order of the Board of Trade or the Court be deemed a distinctive mark.

Trade Marks may be registered in fifty classes, and the legal protection of the Trade Mark is restricted **to the class in which it is registered.**

The ***Classes of goods*** with which the pharmacist is mostly concerned are the following. (We give them in order of frequency) :—

I. **Chemical substances used in manufacture, photography or philosophical research,** and **anti-corrosives.**

II. **Chemical substances used for agricultural, horticultural, veterinary,** and **sanitary purposes.**

III. **Chemical substances prepared for use in medicine.**

XLII. Substances used **as food** or as **ingredients in food.**

XLIII. **Fermented liquors** and **spirits.**

XLIV. **Mineral** and **aerated waters,** natural and artificial.

XLVII. **Candles, common soap, detergents illuminating, heating, or lubricating oils, : matches, starch, blue,** and other preparations for **laundry purposes.**

XLVIII. **Perfumery** (including toilet articles, preparations for the teeth and hair and perfumed soap).

We indicate Trade Marks by the ✱ preceding the name of the article and have added *the numbers* thus : T.M. 326021 to each, so far as our searches at the Patent Office have indicated. Having to consult these numerous classes, omissions may have occurred. As the Patent Office Public Index is continually under revision it is possible that alterations may have been made subsequently. We shall therefore welcome information as to corrections for consideration in a future edition.

The provision of the numbers enables any person by the payment of a small fee at the Patent Office to obtain information as to the status of the Trade Mark in question—date of registration, date of payment of renewal fees, details of assignment and so on. This information could not reasonably be incorporated in our pages.

The late S. W. Woolley, Editor of the "Chemist and Druggist" (London) did excellent service in showing up the anomalous condition of the law in regard to Trade Marks—particularly in respect of

Trade Marks for Patented Articles.

When an article has been introduced as new and has been first manufactured under a patent, the name by which it is known becomes common property as soon as the expiration of the patent rights put an end to the monopoly in the manufacture and sale of the article, and although the name may, down to that time, have identified the goods with the maker of them, it is no longer available for him as a Trade Mark or Trade Name.

"It is impossible to allow a man to prolong his monopoly by trying to turn a description of the article into a Trade Mark. Whatever is mere description is open to all the world."—*Lord Justice James, in Cheavin* v. *Walker* (1877).

When it is understood that a Trade Mark, by renewal every fourteen years, can be continued indefinitely, and that renewals of the Trade Marks applied to patented articles are made after the expiry of the patent, the extent of the continuance of the monopoly will be realised.

The Patents, Designs and Trade Marks (Temporary Rules) Act 1914 and the Rules made under it with which we dealt very fully in our 17th Edn., p. 956 *et seq.* were " to continue in force during the continuance of the present state of war in Europe and for a period of 6 months thereafter."

It may be recalled as an important point that certain Trade Marks, *e.g.* Aspirin, Lysol, Metol, Urotropin were ***avoided*** (meaning legally invalidated or made of no effect). These words are ***public property*** and the rights which the registration originally gave to the owners have come to an end.

Certain words were on the other hand, temporarily ***'suspended,'*** *e.g.* Salvarsan, Neo-Salvarsan and Novocain.

The Patents and Designs Act, 1919, strengthens the provisions for the protection of British Industry in the Act of 1907. The 1919 Act is concerned 'for the prevention of abuse of monopoly rights'; if within four years from the date of a patent, the invention is not worked within the United Kingdom on a commercial scale, or if the demand for the patented article in the United Kingdom is not adequately met, and for other reasons, the Comptroller may grant '*licences of right*' (exclusive or non-exclusive) to any applicant on such terms as he (the Comptroller) may decide or may even revoke the patent.

Section 11 enacts that the specification for an 'invention relating to substances prepared or produced by chemical process or intended for food or medicine' ***shall not include a claim for the substance itself,*** except when prepared or produced by the special method or process of manufacture described and claimed (in the specification) or by its previous chemical equivalent. Any applicant is *prima facie* entitled to a licence for a food or medicine *patent*. Registration of assignments, etc., of patents is made compulsory. The term of a patent is to be ***sixteen years*** instead of fourteen, and existing patents and licences are extended for two years accordingly.

Proprietary Medicines often called erroneously '*Patent*' are dealt with in Vol. II.

The Trade Marks Act, 1919, in force since April 1st, 1920, divides the register of trade marks into two parts; ***part A*** is to consist of those marks already registered and those hereafter registered under the previous Acts (which, with some amendments, remain in force), ***part B*** is to contain a new class of marks, for ***any mark which has been in use for two years*** may be registered, under the new Act, unless deceptive or closely resembling a mark already registered. This is apparently intended to permit the registration of many marks which could not be registered under the previous Acts. Registration in part B will, however, only be *prima facie* evidence of ownership: it will never become conclusive, whereas registration in part A is generally conclusive after 7 years. An important new provision is Section 6:— ***'Where in the case of an article or substance manufactured under any patent.....a word trade mark .....is the name*** or only practicable name of the article or substance so manufactured, ***all right to the exclusive use of such trade mark,.....shall cease upon the expiration or determination of the patent,'*** &c. There is also a provision against registration of a word 'which is the only practicable name or description of any single word chemical element or single chemical compound as distinguished from a mixture.' These two provisions are intended to prevent the abuse of trade mark law.

CONFERENCE ON EMPIRE PATENTS, June, 1922, in London. To institute a system of granting patents, which should be valid throughout the British Empire. Need of having an agreement on the definition of the word 'inventor' and the rights of importers to obtain a patent. There is a divergence of practice between the United Kingdom and some of the Dominions. A Commission of legal, technical and business men, and Government officials, necessary. There is a semi-chaotic state of things.—C.D., Aug. 26, 1922.

Patenting of Medical Inventions. Proposed scheme of Dedicated Patents. —B.M.J. i./30,957, 1204 (corresp.). Sir H. H. Dale, *Suppt. ibid.* i./31,266.

Departmental Committee on Patents and Designs Acts. Recommendations.—B.M.J. i./31,641.

THERAPEUTIC INDEX
OF
DISEASES AND SYMPTOMS.

Internal Remedies and Chemicals Injected are in Roman type. Vaccines as a general rule are for hypodermic use.

Remedies for local or external use are in italics in a separate paragraph. Great care should be taken as the Index is merely intended to refer the reader to the text.

Abortion, Threatened.—Hydrastis, Quinine, Sumbul, Viburnum, prunifolium.

Abscesses, General, to abort.—Aconite, Belladonna, Calcium Sulphide, (*e.g.* in Stearettes, Mang. Butyrate, Quinidine Preps., Quinine, Staph. Vaccine.

Locally.—Acid Carbolic, Argenti Nitras, B.I.P.P., Colloidal Iodine, Dakin's Solution, Eusol, Hydrogen Peroxide, Tincture of Iodine, Unguentum Belladonnæ, Ung. Iodi Intinctum. See also WOUNDS.

Abscesses, Dental. *Locally.—Boric Acid Lotion, Copper and Zinc Ionisation, Dental Solubes, Formosyl, Borated Hydrogen Peroxide, Iodates.*

Abscess Liver, Tropical.—Antimonials, Arsenicals, Auremetine, Emetine Injections, 'E.P.I.,' Ipecacuanha, Vaccine of Organism if isolated, Quinine Injections.

Achlorhydria. Ac. Hydrochlor. dil., Gentian, Tinct. Nucis Vom., Pepsin with Acid., Pancreatin c. Alkali.

Achlorhydria in a variety of conditions cured by Pepsin and Hydrochloric Acid.—T. H. Oliver and J. F. Wilkinson, B.M.J. ii./30,1048.

Acidity of Stomach.—Alkalis, Ammonia preps., Aperfine, Belladonna, Bismuth preps., Bismuth and Pancreatin, Biscinod, Calcii Carbonas, Carbo Ligni, Charkaolin Granules, Cremor Magnesiæ, Magnesii Carb. or Oxide, Oleum 'Elliott' Caps., Potass. Bicarb., Sodii Bicarb.

An ounce of Almond Oil (internally), *q.v.*, first thing in the morning, repeated before other meals if necessary. See also Hyperchlorhydria.

Acidosis.—Administer purgative, wash out stomach, then subcutaneous, or better, intravenous injection of Sodium Bicarbonate Solution. Sodium Lactate or Sodium Citrate *per os*—Glucose Rectal Injection.

Acidosis in diabetes, starvation, various poisonings, cyclic and periodic vomiting, etc.—Alkalis, Alcohol. See also **Diabetes.**

Laboratory observations on acidosis.—G. Matthew Fyfe, B.M.J. i./27,800

Acidosis, of Gastric Ulcer. — Calc. Phosph. Tribasic., Magnes. Phosph. Tribasic.

Acne.—Acid Camphoric, Arsenic, Brominol, Calc. Chlor. intrav., Calc. Sulphid. Stearettes, Fæxin, Fæxin Extract, Guaiacol Hypophosphites, Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Brom., Ol. Morrhuæ, Phosphorus, Pot. Brom., Quininæ et Ferri Citras, Sod. Brom., Stannoxyl, Sulphur (and Colloid), Sulphur Stearettes. Turpentine in Oil Injection, Vaccines.

Locally.—Acid Carbolic, Acid Lactic, Acid Nitric, stabs, Anserin Mulls, Medictd., Calaminæ Lotio, Hydrarg. Perchlorid. Lotio, Ichthyol, Ichthyol-resorcin and Salicylate, Iodates, Isopropyl Alc., Lotio Sulphuris cum Saponel, Quillaia Lotion, Ung. Resorcin Co., Colloidal Metals (Silver, Mercury, Sulphur), 'Cremor Sicc.' preps., Sulphur Colloidal, Sulphur Ung., Sulphur Hypochloritis Ung., Sulphur Iodid. Ung., Thymol Ung., 'X' Rays.

Use plenty of hot water to the face and wash night and morning with soap and spirit—then Calamine Lotion and allow to dry on.—B.M.J. i./17,604.

In intractable acne vulgaris, gastric acidity should be tested. Cases with a low acidity benefit from a mixture containing dilute Hydrochloric Acid, Cascara Sagrada and Tincture of Nux Vomica.—per Pres., Oct., '26, 346.

Hence continued infection of the face probably takes place from the scalp, A spirit shampoo should be used weekly.—H. G. Adamson, L. i./25,401,

X-rays in acne.—J. B. Higgins, L. ii./29,609.

Acne Rosacea.—*Finsen Light and 'X' rays.*

Acne Rosacea cured in 5 weeks by Tartrated Antimony, 1/16 grain *per os* thrice daily after meals, combined with application night and morning of a lotion containing Sulphur, Zinc Oxide and Magnesium Carbonate. Good results also in furunculosis and ulcerative legs.—L. W. Bain, B.M.J. ii./29,51.

Acromegaly.—Pituitary Extract, Thyroid Extract (guardedly), Potassium Iodide, and a Mercurial Salt (value doubtful except where there is a specific taint).

Headache of, relieved by Antifebrin, Phenacetin, Exalgin, Magisal, Migralgin, Phenazone.

Sweatings of, by Zinc Oxide, Atropine or Picrotoxin.—L. i./09,28. See also **Elephantiasis.**

In nearly all cases there is a definite change in the pituitary gland which takes the part of an adenomatous overgrowth. For a useful account of the clinical signs and operative procedure, see J. A. Walton, B.M.J. ii./22,838. See also our page 956.

X-ray treatment should be tried in acromegaly.—R. A. Young and W. J. Adie, L. ii/29,876.

See also **Ateliosis.**—Therap. Index.

Actinomycosis.—Cupri Sulph., Sol. Argent. Nit. Injectio 20%, Hyd. Pot. Iod., Potassii Iodid., or Sodii Iodid., Salicylates. Thomassen's Iodide Method, Iodi Injectio, Iodine Injection, Actino. Vaccine. *See also Vol. II.*

Argent Colloidale, Cupri Sulphas, 'X' Rays.

Tincture of Iodine in milk. Dose.—5-10 minims in half a cup of water three times a day. 'Effect almost incredible.'—H. Chitty, B.M.J. i./26,419 ; i./29,347. See also Pres., Oct., '29, 345.

Radium treatment cured.—per Pres., Oct., '26,346.

Vaccine used, the nidus of infection a tooth.—W. R. Judd, B.M.J. ii./26,887.

Actinomycosis of the tonsils. An interesting case.—B.M.J. i./30,148.

Addison's Disease.— Arsenic, Iron, Phosphorus, Suprarenal preparations. Adrenalin hypodermically may increase blood pressure a little.

Treatment at Guy's Hospital. Hydrochloric Acid 2 drachms thrice daily with 10 ounces of water containing sugar and orange juice. *B. acidophilus* culture is given three times daily, and a tablespoonful of Charcoal morning and evening. An autogenous vaccine, prepared from the hæmolytic Streptococcus isolated from duodenal contents, is injected in increasing doses. Anæmia is treated by Arsenic, and when necessary by repeated transfusion, and the spinal symptoms by exercises. The best results only obtained by this combined attack.—A. F. Hurst, L. i./25,1212.

Enteric-coated capsules of suprarenal cortex of service.—B.M.J.E. ii./29,43.

Adenoids.—Cod Liver Oil, Iodine, Iron, Liq. Ferro-Manganes. Pept. cum Hæmoglobin, Liq. Iodo-Ferro-Manganes. Pept., Syrup Iodo-Tannicus.

Locally.—Ammon. Chlor. Snuff, Glycerin vel Liquor Ferri Perchlor. Nasal Injection of Tannic Acid, Nebulæ (q.v.) 'X' Rays.

Orris Root Powder and Soap on septum to induce sneezing.

Adhesions, Fibrous, Peritoneal, etc.—Injectio Thiosinamin et Phenazoni, Inject. Thiosinamin et Sod. Salicyl.

Adiposity. *See* **Obesity.**

Ague.—*See* **Malaria.**

Albuminuria.—Acid. Gallic, Agmel, Basham's Mixture, Ferri Cacodylas, Fuchsine, Juniper Oil, Nitroglycerin, Vinum Diurecticum, Viscum. *Differential Diagnosis, see Vol. II.*

Polyuria associated with pituitary disfunction.—E. B. Verney, L. i./29,539.

Alcoholism.—Acid Hydrocyanic, Ammonium Chloride, Arsenic, Atropina, Auri Chlorid., Capsicum, Chloral Hydras, Cinchona, Colloidal Gold, Digitalis, Hydrastis, Hyoscinæ Hydrobromidum, Hyoscyamus, Lupulin, Mistura Antidipsomanica, Mist. Belladonnæ Xanthoxyli et Hyoscyami, Mistura Ferri Aperiens, Mistura Magnes. Sulph. Co., Nux Vomica, Phosphorus, Picrotoxin, Stramonium, Strychnine, Atropine and Strychnine hypodermically to keep the patient away from drink ; Apomorphine if mad drunk. For insomnia of; Elix. Chloralamide.

D. E. Stanford Park on treatment of inebriety and drug habit.—L../22,691: ii./24,491, v. also our pp. 365 and 554.

USEFUL OUTLINE OF TREATMENT.

Calomel at bedtime, "Salts' or Seidlitz in the morning. Acute gastritis is treated by ½ grain doses of Calomel every half hour for 5 hours followed

by 'Salts,' Apomorphine hypod. for acute alcoholism. Nervous patients receive Bromide well diluted *per os* and Strychnine 1/30 grain *hypodermically every six hours*. Suspend Strychnine after six days and give then ½ ounce every hour of the following mixture :—Tinct. Capsici 1 drachm, Liq. Extract of Quassia and Tinct. Ignatia (or Nux Vomica) of each 1½ drachms, Water to 8 ounces.—A. M. Rosebrugh, B.M.J. i./14,704.

Ammon. Chlor. is an antidote to excess.

Albuminuria cleared up under Quinine.—Is albuminuria a contraindication to use of Quinine in pregnancy ?—W. M. Hewetson, B.M.J. i./30,761.

Albuminuria—a general resumé.—J. C. Spence, L. i/29,623.

The following is a useful 'draught' on the morning after a 'big dinner' :—Sodii Bic., Pot. Brom. *aa*. gr. 20, Tinct. Card. Co., Tinct. Gent., Co., *aa* 1 drachm. Aq. *ad* 1½ ozs. (Calomel 5 grains if bowels not already loose).—C.D.

Alkalipenia.—*with reference to acidosis, as observed in children.* A normal adult wants approximately 75 grains (5 Gm.) Sodium Bicarbonate to render the urine alkaline, and an infant 20 to 40 grains. In acidosis approximately 100 to 200 Gm. are required to produce an alkaline urine. Over 200 Gm. death ensues.—A. D. Symons, L. i./22,627.

Alopecia.—Arsenic, Arsenic and Iron Injections, Hæmoglobin, Iron, Pilocarpine, Strychnine, Thyroid Gland (Standardised) Preps., either Tabs. or Liquor.

Locally.—Ammon. Liquor, Amyl Nitrite with Pilocarpine Hair Lotion, Burt's Fluid, Cantharides preps., Carbon Dioxide, H. F. C., Hyd. Oleas, Hyd. Perchlor. vel Subchlor., Lin. Iodi, Liq. Carb. Deterg. 20% *Lotion c. Glyc.* 10%, *Chrysarobin, Lotio Capillaris, Lotio Balsumi Peruvian, Lotio Excitans, Lotio Resorcini, Lotio Ætheris, Comp. Baume Fioraverti, Lin. Jaborandi, Lotio Resorcin et Ac. Salicyl., Lotio Resorcin, Pilocarpin et Canthar., Ung. Cadini, Spiritus Acid. Lactic, 'X' Rays (small doses).*

Seborrhœic Alopecia treated with Saturated Solution of Sulphur in Carbon Bisulphide (Inflammable).—Sabouraud.

Good results from application of Cholesterol solution.—per Pres., Oct., '29, 334.

Alopecia areata.—Malcolm Morris advised patient to cut a lemon or two (or limes, if necessary), to sprinkle the cut surface with Goa Powder and to rub the part.—Sir N. Walker, L. ii./29,214.

Anterior Lobe Extract 1 Cc. hypodermically once, twice, and then thrice weekly successful—L. ii./31,1363.

Amenorrhœa.—Actæa and Cimicifugin, Aloes, Apiol, Cantharides, Caulophyllin, Corpora Lutea, Dewees' Mixture, Ergot and Apiol Caps., Elixir Ergotæ cum Ferro, Gossyp. Rad. Cortex, Guaiacum and Apiol, Iron Salts, Mang. Oxidum, Mist. Senecio Co., Ol. Rutæ, Ol. Pulegii, Pil. Aloes et Myrrh., Potass. Permang., Pulsatilla, Savin, Senecio, Tanacetum. Thyroid Gland (Standardised Liquor and Tablets).

Amœbiasis.—Auremetine, Ipecacuanha or Emetine Injection or 'Stearettes' or Salol-coated pills of Ipecac., Emetol, Emetine Periodide, or Emetine Bismuth Iodid.

Intestinal amœbiasis. Symptomatology. Why the same infection should produce active diarrhœa in one and chronic constipation in another cannot at present be determined.—P. Manson Bahr and C. B. V. Tait, L. ii/29,1028. See also **Dysentery.**

Anæmia.—Arsamin, Arsenic, Cacodylates, Calcii et Ferri Glycerophosphas, Calcii Hypophosph., Calcii Phosph., Chlorophyll preps., Cholesterin, Corpora Lutea, Elix. Gent. Acida, Elix. Hæmoglobin, Ferri Bromid., Ferri Perchlorid., Ferrous Chloride, Liquor Ferri Hypophosph., Ferri Iodidum, Ferri Perchlorid., Glycerol Glycerophosphatum, Ferri Phosph., Ferri Sulph., Ferrum Dialysat., Glycerol Glycerophosphatum cum Medulla rubra, Lecithin Elixir and Emulsion, Liq. Ferri Albuminati, Liq. Ferri Pept., Liq. Ferri-Mang. Pept., Liq. Iodo-Ferro-Mang. Pept., Liq. Ferro-Mang. Pept. cum Hæmoglobin, Manganese Cit., Marrubin, Malted Glycerophosphates, Nucleinic Acid, Ol. Morrhuæ, Phosphor., Pil. Ferri Carb., Pil. Ferri Sulph., Quinine preps., Quinine et Ferri Chlor., Saccharum, Sirop Neurotonique, Sodii Hypophosph., Spleen Substance, Strych. Cacodyl., Syr. Iodo-Tann., Syrupus Tann-Iodo Phosph., Vinum Tann-Iodo Phosph.

Leukæmia successfully treated by inoculation of malaria, 3 Cc. of blood from a malarial patient being injected subcutaneously.—per Pr., June, '26,433.

In rat experiments, inorganic Iron Salts were useless for nutritional anæmia,

whilst the ash of liver, lettuce, or maize was highly effective. It was found that the effect of the liver extract or ash could be imitated by the use of small amounts of Copper in conjunction with inorganic Iron.—B.C.A., '28,A790.

Anæmia, Pernicious.—Arsenicals, Benzol Capsules, Four Gland Tablets. ***For Liver and Hog Stomach*** (Ventriculin) ***Treatment*** see p. 951.

It is stated that Iron is an absolute poison—the liver already contains excess to draw upon—but arsenic does good.

Achlorhydria the fundamental predisposing cause. Hydrochloric Acid in large doses should always be tried.—T. Houston, B.M.J. ii./24,1209.

Repeated doses of Calomel 2 grains, at first twice a week for six weeks, afterwards once a week for further six weeks, and finally once a month. Improvement most marked.—J. C. Ferrier, B.M.J. i./21,932.

Treatment should consist of radical oral sepsis, giving Hydrochloric Acid, regular use of sour milk, and inoculation with a vaccine made from Streptococci, isolated from patient's duodenum by means of a Ryle's tube—A. F. Hurst, B.M.J. ii./22,978.

Daily injection of 100 mgr. Tryptophane and 200 mgr. Histidine gave rise in blood count.—L. i./31,256.

Marmite said to be equal to Liver in India.

For Blood Counting and Staining see Vol. II.

Anæsthetics by inhalation.—A.C.E., Acetylene, Æther (and with Alcohol and Oxygen, and Gas and Oxygen), Æthyl Bromid., C.E., Æthyl Chlorid., and with Nitrous Oxide, Æthyl Iodid., Chloroform (and with Oxygen and Hyoscine-Morphine), Ethanesal, Ethylene, Nitrous Oxide, Somnoform. For a 'rough sketch' of Chloroform Administration *v.* p. 283.

Gas and Oxygen extremely useful, many cases being dealt with which would not stand a more toxic drug.—Sir Crisp English, B.M.A., L. ii./23,302.

Vernon-Harcourt Regulator, see p. 282; Shipway's App., p. 282.

For treatment if danger arises with Chloroform, see p. 283; with Ether p. 97, with Ethyl Chloride, p. 106, and Nitrous Oxide, p. 142.

Alcohol *intravenously.*

Heart arrest—Adrenalin by intracardiac injection or intravenously.

Anæsthesia, Intra-Spinal, see Kerocain, Stovaine, etc.

Anæsthetics Local.—*Æther, Acid. Carbolic, Adrenol (throat spray), Adreucaine, Æthyl Chlorid., Alopon, Anesthone, Apothesine, Avertin (amnesic in childbirth), Butyn, Benzamine, Cocaine (and Substitutes), Cocaine Ionised, Erythrophlœinæ HCl., Ice, Kerocain, Menthol, Methyl Chloride, Papaverine, Paraldehyde (intravenous), Percain, Phenolaine, Quinine, Quin-Hydrochloro-Carbamid., Stovaine, Tropacocaine, Tropacocaine Infiltration and Intraspinal Injection, Scopolamine-Morphine Injection, also Scopolamine-Morphine-Atropine, Magnesium Sulphate Intraspinal Injection, Spinocain, Stovaine with Dextrin (Tyrrell Gray). Æther-Saline intravenously, Ether in Oil per rectum.* (Many of these are, of course, *injected.*)

Potassium Sulphate 0·5% added to local anæsthetics for intraspinal injection enhances action.

Anæsthetics, Hypnotics to use with.—Avertin, Barbiturates, Morphine, Nembutal, Paraldehyde, Scopolamine, Sodium Amytal. *See also* Hypnotics.

Anal Fissures. (*Locally*).—*'A.B.A.,' Belladonna Ointment, Carbolic Acid, Glycerin Aloes, Ichthyol, Iodoform Suppositories, Percain Injection, Quinine HCl. packing and suppos., Ung. Conii.*

Quinine Urea Hydrochloride injections, afterwards swabbing with French Tincture of Iodine and Tinct. Benz. Co. 1 oz. each, Camphor 1/3 oz., Chloral Hydrate 1/3 oz., Phenol 1/3 oz. Soothing effect.—C. Howard, L. i./31,914.

Analgesics (Anodynes).—Acetanilide, Atropine, Belladonna, Butyl Chloral, Camphor, Cannabis, Chloretone, Cocaine and substitutes, Codeine, Conium, Gelsemium, Hyoscyamus, Hyoscine, Morphine, Opium, Orthoform, Phenacetin, Phenazone.

Locally.—Methyl-Aspriodine, Ung. Methyl Salicyl. Co.

Anaphrodisiacs.—Bromides, Iodides, Opium, Belladonna, Hyoscyamus, Salix Nigra, Stramonium, Purgatives.

Aneurism.—Aconite, Amyl Nitris, Calcii Chlorid., Digitalis, Ergotina, Iodoprotein Tabs., Morphine, Nitroglycerin, Potassii Iodidum, Veratrum.

Gelatin Injection. Diagnosis.—'X' Rays.

Angina Pectoris.—Aconite, Æther, Æthyl Iodid., Alcohol, Amyl Nitris, Arsenic, Chloroform Inhalation Capsules (not with low blood pressure), Digitalis, Digitalin cum Nitroglycerin Tabellæ, Erythrol Nitrate Tabellæ, Hoffmann's

Anodyne, Hydrogen Perox., Ibogaine, Mannitol Nitrate Tabellæ, Morphinæ inj. hypod., Muscle Extract, Nitroglycerini Liquor and Tabellæ, Papaverine, Phenazone, Sodii Nitris, Sod. Theobromine-Sodium Iodide. Tab. Sodii Nitritis Comp., Theobromine, Theobromine Aceto-Salicyl, Theobromine Sodium Salicylate, Theophyllin Sod. Acet., Trilactine.

The following powder recommended for treatment : Aspirin 3 grains, Quinine Valerianate 3 grains, Caffeine 2/5 grain, Powdered Opium 1/5 grain—to be given in a cachet every two hours.—per Pr., Mar., '27,201.

Paravertebral anæsthesia of first, second and third ganglions by 1% Novocain solution, and subsequent injection of 5 Cc. 70% to 80% Alcohol into each ganglion, of unquestionable therapeutic value and gives both immediate and remote results.—Pletnow, Jl. A.M.A. ii./29,1667.

Injection of 10 Cc. of 1% Stovaine solution under the skin at the site of the most severe pain gave definite relief, when nitrites, etc., had failed. Valuable in patients with angina pectoris due to coronary spasm.—B. M.J.E. ii./31,7.

X Rays have been used in France—anterior and posterior applications of varying doses.

Angina, Pain of—Amyl Nitrite. Carbonic Snow.

Ankylostomiasis (caused by Ankylostomum duodenale).—Carvacrol, Carbon Tetrachlor., Eucalyptus Oil, Filix Mas, Ol. Chenopodii c. Thymol, Pelletierine, Podophyllin, Tablets Betanaphthol and Phenolphthalein, Terpine, Tetrachlorethylene, Thymol (not suitable for the old or very young), Thymol Carbonate.

Betanaphthol treatment. No untoward effect with 50 to 75 grain doses, of the powdered drug.—C. N. Leach and G. E. Hampton, per Jl. Trop. Med. May 1/23,145. *See also* Sept. 1, 22,285.

Ankylosis. *Locally.—Chlorine from Sodium Chloride, also other drugs, by ionisation.*

Anodynes. *See* **Analgesics** and **Neuralgia.**

Anorexia.—Calumba, Capsicum, Cascarilla, Chiretta, Cinchona preps., Gentian, Ignatia, Nux Vomica, Quassia, Quinine, Strychnine, Syr. Kolæ Comp.

Anthrax.—Acid. Carbolic, *Camphor Injection, Iodi Tinct. Inject., Sclavo's Serum.*

N.A.B., 0·6 Gm. intravenously daily, or on alternate days, specific ; will save life and render surgical intervention unnecessary. Treatment generally adopted throughout S. Africa.—A. B. M. Thomson (Durban), B.M.J. ii./31,921. Report of a case so treated with success at St. Olave's Hosp., Rotherhithe.—J. J. Coghlan and H. J. Shorvon, *ibid.* Widely used in this country.—C. G. Brentnall, *ibid.* 966.

Anthelmintics.—*See* **Worms.**

Antidotes.—*See* Chapter ; they are also fully referred to in the text ; *see also* list of *Emetics* in this Index.

Antipyretics. *See* **Fever.**

Antiseptics for Hands, Instruments, etc. (*See also* Chapter on).—*Acid. Boric, Carbolic, Alcohol, Clove Oil, Diffusol, Ether Soap, Formosyl, Harrington's Solution, Hyd. Biniod., Hyd. Oxycyanid., Hyd. Perchlor., Iodine Tincture (q.v.), Izal, Ol. Sinapis (much diluted), Metaphen, Perfumed Formosyls, Tannin in Alcohol, Thymol Disinfectant.*

Antiseptics for Wounds.—*Acid. Boric. Lotio and Ung., Acid. Carbolic Lotio and Ung., Acid Salicylic, Lotio and Ung., Acriflavine, Alcohol 75% (steriliser of skin), Allantoin, Aluminii Acet. Lotio, Anserin Mulls medicated, Aristol, Benzoin Co. Tinct., Brilliant Green, Bromphenobis, Cheatle's Green Spray, Cloramine T., Collodium, Colloidal Metals, Dakin's Solution, Diffusol, Eupad, Eusol, Formosyl, Glycerinium Iodoform, Hydrarg. Biniod., Hydrarg. Perchlor., Iodoform Wool, Iodine in CCl_4, Iodine in Liq. Paraffin, Iodine in Spirit, Iodised Carbon, Iodine Colloidal, Izal, Kelly's Paint (Collod. Benzoin), Liq. Hydrogen Peroxidi, Mercuro-Zinc Cyanide, Mercurome, Perchloride Solubes, Phenol and Camph. combined, Potass. Permang., Resorcin, Menciere's Solution, Malachite Green (and with Sublimate), Metaphen, Proflavine, Salol,* see Chapter on Antiseptic Values, Vol. II., and Chapter on *Wounds* in this Index.

Antiseptics, Intestinal.—Acid. Boric, Acid. Carbolic, Acid Iodic, Aspriodine, Benzonaphthol, Bisciniod, Bism. Salicyl., Calcii Sulphid. Stearettes, Carbo Ligni, Charkaolin Granules, Dimol, Ichthyol, Ichthoform, Kaolin, Koumiss, Mercurials, Methyl-Aspriodine, Myrtillus, Naphthalene, Naphthol, Phenol-Bismuth, Phenyl-Aspriodine, Pil. Bism. Sod. Sal. and Salol, Quinine

Acetyl-Salicyl, Quinine Salicylate, Salacetol, Salol, Sedasprin, Sodii Hyposulphis, Sod. Oleat Co. Capsules, Sulphocarbolates, Trilactine, Trilactine Milk, Tylcalsin, Tylmarin, Tylmarin-Quinine.

Many of these drugs may be prescribed for local action in Stearettes and Formagules, *q.v.*

Antiseptics for the Mouth.—Formalin Tablets (Internal). Formosyl Mouth Wash, Liq. Antisepticus, Thymaglycin.

Antiseptics Urinary.—Acid Iodic and Iodates, Benzoic and Boric Acids, Cystazol, Salol, Hexamine, Hexamine-Resorcin, Hexyl-Resorcin, Mercurome (by urethral injection), Methylene Blue, Tylmarin, Uro-hexoids, Vesalvine 'S' and 'B.' See also Cystitis. Zinc. Sulphanilas (urethral injection).

Roy. Soc. Med. Discussion. Many antiseptics are in use—but the bladder is not lined with glass. Mercurochrome intravenously in a dose of 4 mgr. per kilo in 1% solution is employed, but occasionally results in rigors, vomiting and diarrhœa, and should only be used as a last resort. Hexamine in a dose of 5 Cc. of a 10% solution intravenously; *per os* it is intolerable to some, probably due to the HCOH formed. Hexamine in general not well spoken of. Hexyl Resorcin Stockman found ineffective in eradicating the infection, and could not understand the reputation of Salol as a urinary antiseptic. Cuthbert Dukes, from experiments in tie-in catheter cystitis cases, obtained best results with alkalis.—L. i./29,661.

Mercurochrome, 300 mgr. thrice daily *per os* in Salol-coated pills, yields 30% antiseptic urine, but irritates digestive tract; *Hexyl-Resorcin*, in 25% Olive Oil, 0·6 Gm. thrice daily, has less antiseptic value than Mercurochrome and same objections; *Hexamine*, 15 grains thrice daily, causes indigestion, and the excretion of bactericidal urine is uncertain; *Methylene Blue* gave insufficient concentration in the urine to be of antiseptic value; *Pyridium*, 0·2 Gm. thrice daily *per os*, a very weak antiseptic; *Salol* has no place as a urinary antiseptic, as the Phenol content in the urine never reaches germicidal strength.—B. A. Thomas and I. K. Wang, Jl. Urology, per Pr., Sept., '29,228.

Antispasmodics. *See* **Asthma, Convulsions and Epilepsy.**

Anuria, *see* **Urine, Retention of**

Aortic Disease.—Ammon. Carb., Camphor Injection, Erythrol Nit. Tabellæ, Ferri Iodid., Ferri Perchlor., Iodides, Nux Vomica, Sodii Salicyl., Tab. Nitro-glycerin et Sodii Iodid. cum Arsen.—*See also* **Angina Pectoris.**

(Test for Syphilis: Anti-syphilitic treatment.)

Aphonia.—*See* **Voice, Loss of.**

Aphrodisiacs, *see* **Debility and Nervous Debility.**

Aphthæ. *See* Stomatitis.

Appendicitis.—Combined use of Belladonna and Salicylates (*see* Tinct. Bellad.). Glucose feeding per rectum.

Purgative *e.g.*, Calomel 2 gr.; Ice bag, Magnesia, Bismuth Subnitrate; Codeine if pain excessive, diet and regulation of bowels.—Robin's treatment. Mercurochrome. *Glycerin Bellad. and hot fomentation alternately.* Move the bowels not before the 4th or 5th day and not until the 7th if abscess forming, when Calomel and a Saline Aperient should be given if necessary. A Saline mixture with Hyoscyamus is useful.

Causation, diagnosis and treatment.—A. Rendle Short, L. i./25,215,269.

Castor Oil should *not* be given as it further inflames the already irritated gut, causing the appendicitis to take a more violent course than it otherwise would.—G. M. Tanner, L. i./27,970.

Appendicitis, Threatened.

For incipient, Elixir Agrimoniæ Co., Trilactine.

Nasal sinus infection as a causal factor in appendicitis.—P. Watson-Williams, Pr. April, 1921.

Arterial Tension, Raised.—Aconite, Antimonial preparations, Potass. Iodidum, Pulv. Sodii Nitritis Comp., Sod. Sulphocyanide, Veratrum, Viride.

Increase in blood cholesterin does not raise blood pressure. The real factors producing it are unknown and the therapy of high blood pressure at present is miserable quackery! Cholesterin is capable of producing arteriosclerosis in *rabbits*. Arteriosclerosis of the *small* vessels in man effects an increase.—I. Harris and I. J. Lipkin, B.M.J. i./30,587.

See also **Arteriosclerosis, Blood Pressure and Vasodilators.**

Arterial Tension, Lowered.—Pituitary Gland Preparations raise tension of the blood vessels.—*See* **Cardiac Tonics.**

Hypotension treatment.—L. i./29,889.

Arteriosclerosis.—Acetyl-Choline subcutan., Adrenalin, Aspriodine, Benzoates, Calc.-Theobromine Salicyl., Camphor, Citrates, Coramine, Erythrol Nit. Tabellæ, Pacyl, Iodoprotein, Sodium Hyposulphite, Sodium and Magnesium Sulphates, Strophanthus, Syrupus Iodo-Tannicus, Iodolysin (Inj.), Thyroid preps., Trilactine; Depressor Agents, *e.g.*, Hippurates, Pot. Iodide, Nitroglycerin Tabellæ, Tabellæ Sod. Nitritis Co. For pre-sclerosis Diuretics, finally Theobromine and Digitalis.

The most useful drugs are Amyl Nitrite Nitroglycerin, Erythrol Nitrate and Sodium Nitrite.—W. Lyne Blight, L. i./15,1167.

Arteriosclerosis and Bright's disease are too closely associated to suggest a chance coincidence and many observations point to the conclusion that one or more of the causes of Bright's disease are concerned in the production of arteriosclerosis.—Geoffrey Evans, Pr. Jan. 1922, p. 38.

Nature and Classification of types of arteriosclerosis.—Goulstonian Lectures, Geoffrey Evans, B.M.J. i./23,454,502,548; L. i./23,579.

Avoid excess of readily fermentable carbohydrates. Give green vegetables and fruits.—W. E. Deeks, Diet and Disease, 1927.

Arthritis—See **Gout and Rheumatism.**

Arthritis Deformans—See also **Rheumatoid Arthritis** and **Rheumatism Chronic.** Iodine Ionised, Sulphur injected. Peptone intramuscularly.

Treat as in early phthisis.—Cod Liver Oil, Creosote, Guaiacol, tonics, hæmatinics. Later, Iodine and Iodides.—C. W. Buckley, Pr. June 22/412.

Sulphur metabolism in arthritis deformans.—A. P. Cawadias, L. i./27,1283.

Ascarides.—See **Worms.**

Ascites.—See **Dropsy.**

Asphyxia.—Oxygen, Carbon Dioxide and Oxygen.

Schafer's prone pressure method is effected by pressing on the small of the back (thus compressing the abdominal viscera and pushing the diaphragm upwards) for three seconds, turning over on the right side for three seconds, and repeating until resuscitated. This allows mucus and water, in the case of drowning, to run from the mouth. Sylvester's, Howard's, and older methods described.—Problems of Asphyxia, Brit. Assn. Cent. Meeting, L. ii./31,795.

See also Nitrous Oxide—treatment of dangerous symptoms.

Asphyxiating Gases. See Antidotes to poisons at end.

Asthma.—Adrenalin subcut., Æthyl Iodid., Amidopyrin, Ammon. Brom., Ammon. Iodid., Amyl Nitris, Antimony, Arsenic, Aspriodine, Atropine Valerianate, Belladonna, Bromides, Caffeine, Caffeine Tri-Iodide Cap. (Billimoria), Calcii Chlorid (?) *q.v.*, Calc. Brom. intrav., Calc. Theobromine Salicyl, Cannabis, Chloral Hydras, Chloroform, Codeine, Coramine, Ephedrine, Erythrol Nitras, Euphorbia Peplus et pilulifera, Ext. Grindel. Co., Glucose feeding, Grindelia, Hyd. Salicyl, Hydrarg. Subchlorid., Hyoscine, Iodinol, Iodoprotein Tabs., Jaborandi, Lobeliæ Tinct. and Tinct. Ætherea, Lobeline, Magnes. Hyposulph., Mannitol, Menthol, Naphthol, Nitroglycerin, Papaverine, Paraldehyde, Peptone Injections, and *per os*, Physostigma, Pilocarpine, Potass. Iodidum, Rutæ Confectio, Salol, Sedasprin, Sodii Iodid. and intravenously, Sodii Nitris, Tabs. Sod. Iodid. and Sod. Nit. combined, Stramonium, Spiritus Grindeliæ Co., Strontii Iodid., Syr. Pilocarp. et Pot. Brom., Tabellæ Anti-asthmaticæ, Tylcalsin. An emetic may afford great relief.

Aspirin relieves some cases; in others unsuited.—B.M.J.E. ii./22,33. It dries the mucous membrane of the nose and therefore possibly aborts attack by reducing bronchial secretion.—Clin. Jl. Jan. 17/23,35.

Acid. Sulphuros. Vapor, Adrenalin—as spray. Oxygen has been injected.

Vaccine B. Influenza, Pneumo., Strepto., M. Catarrh., or M. Paratetrag. acc. to predominant organism present, preferably Autogenous.

By Inhalation.—Ammonii Bromidi Vapor, Arsenical Cigarettes, Chloroform Vapor, Coca or Eucalyptus leaves smoked, Compound Asthma Fluid (as spray), Cubeb Cigarettes, Ozonic Inhaler, Potass. Nit. fumes, Pulvis Lobeliæ Co., Pyridine, Stramonium fumes, Vapor Coninæ.

Grindelene does good in severe attacks of asthma. For all chronic conditions nothing so good as a combination of potassium iodide 5 grains, and magnesium sulphate 1 drachm, in 1 ounce of water thrice daily, 2 hours p.c.—E. Jepson, B.M.J. ii./17,650.

Adrenalin 5 to 10 minims injected three or four times a day good. Begin when the breathing is pretty bad.—B.M.J. i./16,36.

Patient's own blood 5 to 10 Cc. subcutaneously in asthma and in migraine.—C. H. Wildish, B.M.J. ii./21,598.

Horse Serum (*q.v.*) is contraindicated in asthmatics.

The bronchiole can be relaxed by paralysing the vagal terminations (Atropine or Hyoscine), by stimulating the sympathetic (Adrenalin or Cocaine), and by relaxing plain muscle (Amyl Nitrite, Benzyl Benzoate, Papaverine). The drugs can be given by injection (Atropine, Hyoscine, Adrenalin, Cocaine, Caffeine), by inhalation or spray (Atropine, Cocaine, Adrenalin, Nitrites, Benzyl Esters). Asthma Powders should be avoided, as they tend to set up bronchitis; and *per os* (Atropine, Benzyl Benzoate).—P. Hamill, B.M.J. ii./25,369, *q.v.*

If specific determining factor can be determined, either remove or avoid it, or immunise specifically or non-specifically by Peptone.—P. Hamill, B.M.J. ii./25,205.

Treatment of asthma.—R. N. Chopra and H. W. Acton, I.M.G., Mar., '25,101.

An all-round attack recommended, *i.e.*, consideration of psychical aspects, remove sources of peripheral irritation, employ exercises for chest development, desensitise where practicable, restore balance in favour of the sympathetic, or attend to general hygiene.—W. Langdon Brown, B.M.J. ii./25,205.

For Food Asthma.—Sod. Ricinoleas.

Asthma and anaphylaxis. Asthmatics should not receive horse serum. Most of the deaths that have occurred after horse serum have been in the horse asthmatics.—F. Coke, B.M.J. i./21,372,582.

This subject is dealt with on page 661 *et seq.*

TUBERCULIN TREATMENT of bronchial asthma and hay fever. 'T.O.A.' employed subcutaneously; initial dose 1 Cc. of 1 : 100,000 dilution. The authors cannot explain *why* a state of hyper-sensitiveness to tuberculin increases the susceptibility for allergic reactions, nor why small amounts of tuberculin have curative effects.—W. Storm van Leeuwen and H. Varekamp, L. ii./21,1366.

0·1 Cc. of 1 in 1,000 dilution of Old Tuberculin in Saline used as Intradermal Test. For treatment dilutions ranged from 1 in 1,000,000 to 1 in 100. With marked reaction to the Test, it is well to begin with 0·1 Cc. of the 1 in 1,000,000. Injections given weekly.—J. Maxwell, B.M.J. i./30,854.

Results of treatment of 500 cases examined at Edinburgh. Autogenous vaccines from a laryngeal swabbing well spoken of.—D. M. Lyon and R. M. Murray-Lyon, B.M.J. i./30,987.

Asthma Research Council, collecting statistics of all kinds.—L. i./29,36,50.

Asthma observations in Edinburgh. Exposure to dust an aggravating factor in 48% of cases. Foods complained of by 38%—more than half incriminated potatoes.—L. i./29,517.

Asthma Research Council Report. Among those suffering from certain allergic conditions and treated with Glucose and Ammonia to combat intestinal and liver disturbance 50% had no attacks and slightly less than 50% improved. Investigations proceeding.—B.M.J. ii./30,145,1138,1140.

Special asthma number.—Pr., July, 1929.

Adrenalin 3 minims and Ephedrine Sulphate 0·025 Gm. by the mouth, or in 3% spray, for asthma in children.—W. R. F. Collis, L. ii./30,569.

Atelactasis, to prevent.—Carbon Dioxide and Oxygen as prophylactic.

Atelosis or Lorain's Disease.—This condition may be regarded as the exact reverse of gigantism. It occurs generally early in life. The patient remains small and stunted and never arrives at full development. Cases have improved after the pituitary gland has been entirely removed.—J. A. Walton, B.M.J. ii./22,839.

Athlete's Foot.—Castellani's Paint, Ung. Acid. Salicyl, Mycozol.

Auricular Fibrillation.—Digitalis, Quinidine. See also Cardiac Tonics.

Auricular fibrillation in children.—H. Cookson, L. ii./29,1139.

There is always Calcium deficiency. Ringer's solution containing about double the usual amount of Calcium Chloride and 2 ounces of Syrup of Glucose to the pint is a good drink which should be drunk freely.—Sir J. Barr, B.M.J. i./30,774.

Aural Discharge.—Hexamine (?).

Trichloracetic Acid for closing of perforations.

Bacilluria (B. Coli).—Collargol, Hexamine and Sod. Phosph. Acid (separately), Hexyl Resorcin, Pyridium, Sandal Wood Oil, Vaccines, make urine alkaline, *e.g.* with Pot. Bicarb. or Sod. Cit.

Alkalis (Sod. Bicarb. or Pot. Cit.) in large amount for B. coli infections in infancy until the urine is definitely alkaline (no degree of alkalinisation can completely inhibit). Then Hexamine and Acid Sodium Phosphate until the urine is acid—then the alkalis are given again.—K. Douglas Wilkinson, B.M.J. ii./30,412.

B. coli infections often get well spontaneously. Give plenty of fluid. Hair, Lepper and Martland found the greatest concentration of HCOH in the urine, after giving Hexamine, was 1 in 20,000, whereas anything less than 1 in 5,000 is said not to be bactericidal. They found that only when the pH of the urine had fallen to 4 are effective doses of HCOH liberated. The urine should be collected under Toluene and the pH tested with Phenol Red.—Proc. Roy. Soc. Med., Jan. 28, quoted by D. Nabarro, B.M.J. ii./30,417.

Balanitis (*Locally*).—*Lotions of Lead Acetate, Zinc Salts, Silver preparations, Tannin, or Zinc Oxide Powder.*

Basedow's Disease.—See **Exophthalmic Goitre.**

Bed Sores. *Locally.—Acid. Tannic, Alcohol, Allantoin, Anserine Mulls, medicated, Argent. Nit. in Nitrous Ether solution, Glycerin, Glycerin Aloes, Iodoform Gossyp. and Ung., Iodine Colloidal, Peruv. Bals., Perfumed Formosyls, Tannin, Iodoform and Starch Powder, Resorcin, Sphagnum, Symphytum Preps., Ung. Rusci Co.*

Beri-Beri.—Extract. Oryzæ Liq., Rice Bran, Phaseolus, Strychnine. Rice should be eliminated. Vitamin-rich food (beans, peas, barley), wheaten flour,—not overmilled—oatmeal to be substituted. Yeast and rice polishings extract said to be curative.

Strychnine, Arsenic, and Silver Nitrate are in repute as soon as the muscular hyperæsthesia has subsided. A routine which has found some favour is the following :—

Magnesium Sulphate 60 grains, Dilute Hydrochloric Acid 20 minims, Tincture of Orange 1 drachm, Infusion of Calumba to 1 ounce. Thrice daily for a week, and repeated after a few days intermission.

If much œdema, the following may be of use :—

Solution of Ammonium Acetate 1 drachm, Potassium Nitrate 10 grains, Potassium Acetate 15 grains, Camphor Water to 1 ounce. Thrice daily.

If the heart shows signs of failure, a mixture of Digitalis, Ammonium Carbonate and Compound Spirit of Æther may be used with advantage.—Brooke.

See also **Accessory Food Factors** in this Volume and Vol. II.

Bile, Deficiency of.—Ammon. Chloride, Bismuth and Opium, Chirata, Colalin, Fel Bovin., Hepatic Stimulants and Antiseptics, *e.g.*, Elix. Gentian Acidum, Salol, Hydrarg. cum Creta, Pancreatised Milk, Sodii Glycocholas, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodii Salicylas, Taraxacum.

There are only two substances known which are really cholagogues ; bile itself and Sodium Salicylate.—P.J. ii./21,490.

Bilharzial Disease.—Antimony Pot. Tart. intravenously, also Antim. Soda. Tart., Antim. Ox. Inj., Auremetine, Emetine Periodide, Emetine Injection, Fouadin, Hydr. Perchlor., Methylene Blue, Thymo-benzene.

Biliary Concretions.—See Gall Stones.

Biliousness (See also Constipation).—Calomel, Chirata, Colalin, Elixir Gentian Acid, Euonymin, Iridin, Leptandrin, Podophyllin, Sanguinarin, Seidlitz Powders, Sodii Phosph. Efferves., Sodii Salicyl, Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Eff.

Magnesium Sulphate 5 Gm., with Peptone 2 Gm., and Licorice Powder 1 Gm., in half a glass of tepid water, stated to be a very active remedy for evacuation of bile from the liver, as well as from the bile-ducts and gall-bladder. Effect enhanced by adding Vichy Water or 2 tablespoonsful of Glycerin. Kaolin, 5-10 Gm., may also be added. After taking, patient should lie on right side for 10 minutes and wait half-an-hour before breakfasting. Treatment continued for 10-15 days in each month.—per Jl. A.M.A. ii./25,551.

Bites and Stings (Insects,—Mosquitoes, etc.). *Locally.—Ammonia, Cocaine, Emp. Bellad., Eucalypt. Ol. (to ward off), Formalin rubbed in, Formosyl, Hydrogen Peroxide, Moskitin, Ol. Betulæ (with Olive Oil), Onion Juice, Phenol, Pulegii Oleum, Sodii Bicarb., Spiritus Chloroformi, Thymol, Vinegar. Citronella Oil with Carbolic Acid good in warding off mosquitoes.*

The *Quinine Acid Hydrochloride and Cod Liver Oil* ointment under Sunburn is advised.—B.M.J. ii./26,718.

Gnat-bite inflammation relieved by saturated solution of Magnesium Sulphate. —R. H. Jamieson and F. Hernaman Johnson, B.M.J. i./31,57 ; also rub the skin with 20% Solution to *keep off* insects.

Wasp sting poison besides its toxic effect on the heart diminishes the coagulability of the blood. Calcium lactate in 20 grain doses two-hourly and Cardiac stimulants effective.—P.J. ii./13,559.

A lotion of Cedar Wood Oil 1½, Citronella Oil 3½, with Spirit of Camphor to 8 as a prophylactic against mosquito, midge and fly bites. The sting of a

bee or wasp should first be removed, and in the case of a bee Ammonia applied, and of a wasp an acid, *e.g.*, Vinegar. Tincture of Aloes with solution of Cocaine useful.—A. C. Roxburgh, L. i./27,1146.

Early local use of 20% Aloes in 60% Spirit for bees', wasps', and hornets' stings, checks pain immediately and prevents or greatly reduces swelling.—Pugnat, Jl. A.M.A. i./29,1897.

Adder Bites.—Incisions and drainage until Antivenin can be obtained.—B.M.J. i./30,387.

Viper Bites.—Calc. Chlorid. intravenously. *See also* **Snake Bites.**

Fly Prevention.—The following have been advised for destruction. For **rubbish heaps,** etc., Chloride of Lime, Sulphate of Iron either powdered or in 20% solution, Borax, Colemanite (crude Calcium Borate), Slaked Lime, Potassium Permanganate. For *use indoors*, Formalin, Alcohol and water. As deterrents, Pyrethrum, Paraffin, Cresol, Carbolic Acid. For spraying outside walls or canvas of hospitals, etc., Berlece's Soln. *v. infra* may be used. Use in the evening or early morning. Another formula is Commercial Formalin 1 ounce, water ½ pint, milk ½ pint. Fly Exhibition, Zoological Gardens, C.D., June 5/1915.

To kill flies a 1% solution of Sodium Salicylate is better than Formalin. Of the latter 1·25 to 2·5% of *Commercial Formalin* is the best strength.

Formaldehyde as a poison for house-flies. Formula recommended: 40% Formaldehyde 5, Lime Water 50, Sugar 2·5, Water 42·5. Should be exposed in a trap protected from air, and the prevention of flies falling in, thus making it acid.—Lloyd, T.D.B., Vol. 17, 1921/123.

Cod Liver Oil has a specific toxic action on all flies, mosquitoes and ticks. Sprinkled on the surface of water it is more effective than Petroleum in the destruction of larvæ.—Lang, P.J. i./14,593.

Pastilles for burning have been advised, made of the following: Phenol 6 drachms, Potassium Nitrate 1½ ounces, Insect Powder 5 ounces, Charcoal 10 ounces, and Mucilage of Tragacanth sufficient quantity. A sponge dipped in Spirit of Camphor will also impregnate the air and act as deterrent.—Ind. and East. Drug., Oct., '25,238.

Berlece's Solution.—Sodium Arsenite 20 Gm., Treacle 100 Gm., Water 1 litre. Steep grass in this and hang it up.—B.M.J. i./15,1006.

Powdered Hellebore (Veratrum Album and V. Viride) ½ lb. to 10 gallons of water applied at the rate of this amount to 8 bushels of manure is an effective larvicide. Has no injurious effects on the manure or plants.—U.S. Dept. of Agriculture, L. ii./15,559.

Insectifuge.—To prevent flies from settling on man and horses.—Pyridine 1, Thymol ½, Safrol 5, Oil of Birch Tar 5, Sperm Oil to 100. Does not irritate the skin. A small quantity to be smeared on the temples, behind the ears and on the head or on leather of harness.

Kerosene is also effectual.

The following Spray Solution should be useful:—

Naphthalin 10, Phenol 10, Camphor 5, Lemon Oil 5, Thyme Oil 2, Lavender Oil 2, Savin Oil 2, Methylated Spirit to 500.

Aloes is a local sedative as in Friar's Balsam. A saturated solution in Tincture of Tolu is good against insect bites.—F. W. Cock, B.M.J. ii./18,256.

Sanodora Pads may be useful.

The black flies on the river banks in Canada are kept off by a mixture of Kerosene and Oleum Succini.—C. E. Sage.

Pine Oil is said to deter Anophiles. *See also* **Malaria** Chapter, Vol. II.

Jelly Fish Stings.—*See* p. 699.

Scorpion Stings.—Lister Institute supplies *Anti-Scorpion Serum.* Dose equivalent to 10 Cc. of original serum. The injection should be made directly into the site of the sting as soon as possible.

See also **Snake Bite Lancets.**

Blackwater Fever.—Caffeine Sod. Benz., Calomel, Eff. Saline, Intravenously Sodium Chloride, Quinine Acid. HCl. *per os* and intramusc., Digitalis, Sternberg's Mixture, Salvarsan, Strychnine, Cholesterin, Meth. Blue intrav.

A disease of metabolism the final stages of which, resulting in 'blackwater,' are intensely influenced by any process of pyrexia coincident with it or preceding it.

Treatment.—Keep patient warm, sponge with warm water; in case of pyrexia, sponge with cold water, with Vinegar and Lime Juice added, keeping

the brain cooled by compresses. On signs of cardiac failure small doses of champagne or brandy and soda water given—soda water could be taken *ad lib.* Warm blanket baths for delirium or rising temperature. A mixture containing the following has been used with good results : Spirit of Nitrous Ether, Potassium Bicarbonate and Potassium Nitrate. In case of bad malarial history or anæmia without such, 1 grain doses of Quinine should be given in addition, alternating with mixture, as soon as stomach can stand it. Suggests trial of Thyroid to stimulate lymphoid system.—G. Rome Hall, Jl. Trop. Med., April 16/23,120.

Calomel 5 to 10 grains, Effervescent Saline. Intravenous injection of Normal Saline Solution, Quinine in nutrient enema (not milk), also Digitalis, and Strychnine in the same form.

Rectal Salines, Camphor in Oil, Strophanthin, Tinctura Iodi, Bismuth, Adrenalin (to stop vomiting). One should watch the heart, give fluids, stop vomiting, watch for complications, especially suppression of urine, syncope, hyperpyrexia. Quinine should not be given, as it may increase the hæmolysis. —Stanley E. Denyer, Clin. Jl., Oct. 3/22.

Sternberg's Mixture. Sodium Bicarbonate 10 grains, Solution of Mercuric Chloride 15 minims, water to 1 ounce. Every two hours for the first day and every three hours after until the urine clears. This in preference to ordinary diuretics.—D. G. Marshall, L. ii./18,417.

The urine clears up more quickly with immediate subcutaneous injection of 5 to 10 ozs. of Normal Saline, and ½ to 1 oz. Magnesium Sulphate is beneficial. The following mixture every hour in 5 oz. of water prevents nausea and restlessness : Sodium Bicarbonate 20 gr., Bismuth Carbonate 10 gr., Tinct. Chlorof. et Morph. Co. 5 min. ('Sternberg's Mixture' causes vomiting.) Large quantities of fluid should be given and patient should not be moved for at least 14 days.—E. P. Carmody, B.M.J. i./25,106.

Sodium Bicarbonate intravenously, 10 to 20 ounces, of strength 150 grains to the pint, curtails duration of attack, prevents blockage of kidney tubules, and avoids suppression of urine.—W. E. Cooke and H. Willoughby, L. i./29,334.

Sodium Bicarb. orally and the Citrates of Lemonade. Sodium Bicarb. 10 Gm., Glucose 10 Gm., given in 1,000 Cc. initially and large amounts (up to 21 Gm. in 24 hours) repeatedly during treatment. Quinine could be taken when the urine was kept alkaline.—C. C. Chesterman, L. i./29,1355. *See also* C. P. Downison, ii./29,47.

Give alkalis as follows : Sodium Bicarb. 2½ oz., Calc. Carb. 5 oz., Mag. Carb. 5 oz., and Bismuth Carb. 10 dr. One teaspoonful every two hours in water from 6 a.m. to 10 p.m., and then a double dose. Boiled water freely every ½ hour. Absolute rest. 3 or 4 doses of Calomel ¾ grain at ½ hour intervals. Soap and water enema at onset and enemas of weak Permanganate twice daily. If temperature like subtertian fever, and parasites are found, give 1 dr. Tinct. Cinchona thrice daily, carefully increased in a day or two, and if no recurrence of blackwater add Quinine Dihydrochloride. If hæmoglobinuria develops stop all food and give nothing but boiled water till urine is clear for 3 days and alkaline in reaction. This only fails where vomiting uncontrollable, when alkalis intravenously may save patients.—J. Forbes, Kenya & E. Africa Med. Jl., Trans. Roy. Soc. Trop. Med., Nov. 25,'29,317 ; Jl. A.M.A. ii./29,1686.

Blackwater fever in London. An analysis of 14 cases studied during the last 7 years.—P. Manson-Bahr and E. G. Sayers, L. i./27,273. Blood transfusion good.—P. H. Manson-Bahr, B.M.J. i./30,17.

See also Vol. II., *special chapter on.*

Blastomycosis.—Potassium Iodide a useful drug.—A. Castellani, L. i./20,943. Successfully treated by (1) Iodoform, (2) an ointment of Salicylic Acid, Ammoniated Mercury Ointment and Zinc Oxide, (3) B.I.P. ointment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,44. Carbon Dioxide Snow.—Jl. A.M.A. i./28,1367.

Saline intravenously—1500 Cc.—A. Patrick, B.M.J. ii./18,404. *See also* Vol. II.

Bladder.—*See Albuminuria and Cystitis.*

Bleeding of Gums.—*Magnes. Lactas. See also* **Gums Inflamed and Spongy.**

Bleeding, to arrest—*See* **Hæmorrhage and Epistaxis.**

Blepharitis.—*See* **Conjunctivitis.**

Blistering Applications.—*Acetum, Collodium, Emplastrum and Liniment of Cantharides, Capsicum preparations.*

Blood Pressure, to Increase.—Pituitary Extract; next in potency is Caffeine. Calcium Lactate moderately effective and Strychnine disappointing. Digitalis to be reserved for cardiac cases.

Blood Pressure, to Reduce—

(i.) **Heart Depressants.**—Aconite, Arsenic, Mercury, Potass. Salts, Quinine, Salicylic Acid, Veratrum Viride.

(ii.) **Vasodilators.**—Acetocholine, Amyl Nitrite and Nitrites, Arsenic, Mercury Pulv., Quinine, Pot. Nitrite and Sod. Nitrite Co., Salicylic Acid.—See also **Vaso-dilators** and **Angina.**

(iii.) **Purgatives.**

The nourishment of the cardiac muscle is conditioned by the blood pressure in the aorta. A *plus* pressure often means increased cardiac vigour. A *minus* pressure often entails cardiac malnutrition. *All* high blood pressures are not evil.—P. M. Chapman, Pr. Jan. 1921.

Thyroid and Manganese in abnormal pressure.

Potass. and Sod. Sulphocyanides have recently been given.

Luminal lowers pressure and has sedative effect. The Sulphocyanides are of value in doses of 1½ to 2 grains thrice daily after food, the dose being increased daily.—John Hay, B.M.J. ii./31,47.

A raised Cholesterol content the most constant blood change found—often above 200 mgr. per 100 Cc. Veratrum Viride (Veratrone), ½ to 1 Cc. intramusc. or *per os* of value, but must be used with caution as fall of blood pressure may be alarming in susceptible patients. Acetylcholine intrav. also of value—0·05 Gm. increased to 0·1 Gm. daily—but extremely dangerous. Venesection still unsurpassed. In the sallow, toxic type, Pilocarpine 1/10 grain hypod. 6 or 12 days, followed by hot wet pack and massage, with colon lavage twice weekly: fruit and fish diet, and Vichy before meals.—A. H. Douthwaite, B.M.J. ii./29,844-847.

Table salt in hyperpiesis. When renal, cardiac, or cerebral complications are present, give non-pressor table salt, if craving is felt, consisting of Ammonium Hippurate 1, Potassium Nitrate 4, Potassium Chloride 25. In emergencies, as threatened or actual apoplexy, lumbar puncture. Venesection up to 500 Cc., followed by fasting for a couple of days, gives relief. For toxæmia resulting from intestinal stasis Pot. Permang. 1 grain per rectum in a pint of water every morning for 3 weeks, with Calomel 2 grains at night twice weekly, followed by Saline *mane*. In lesser grades, Pot. Chloride 2 grains *t.d.* in a tumbler of water. For cardiac types, Theominal is diuretic and lowers pressure. Iodides of little use. French Tinct. Iodi 5 minims in water or milk *p.c.* better. Sodium Sulphocyanate, 3 grain tablets *per os*, where organic changes in the arteries are absent. Choline derivatives, *e.g.* Pacyl, *per os*, and Acécoline parenterally. Animasa, a muscle extract, of benefit in sclerotic cases.—J. F. Halls Dally, B.M.J. ii./30,10.

High blood pressure etiology. Due possibly to presence in excess of a specific amino-acid. This may be due to retention resulting from renal disease, to over-production, or more probably to some impairment of hepatic function whereby this body is not efficiently destroyed.—R. G. Waller, B.M.J. ii./30,595.

Vegetarian diet not ideal. Butcher's meat might be allowed two or three times a week. Copious amounts of fluid not good. Iodides head the list of useful drugs. Digitalis (though paradoxical) often good.—Sir Thos. Horder, B.M.J. i./30,741.

In uncomplicated hypertony give Mistura Alba as routine treatment. Drinking large quantities of water often beneficial.—I. Harris, L. ii./31,1.045.

Dropping cigarette smoking caused fall in blood pressure.—H. H. Sanguinetti, L. ii./30,1291.

Radium Chloride solution by mouth or injection in treatment of high blood pressure.—N. Mutch, L. ii./31,1013. Further animal experiments necessary.—A. T. Todd, L. ii./31,1102.

Histamine has been suggested.

Blood, to increase coagulability of, see List p. 250.

Boils and Carbuncles.—Acid. Sulph. Dil., Alkalis, Arsenic, Biscniod, Calcii Lactas, Calx Sulphurata, Ferri Perchlor., Hyd. Salicyl., Hypophosphites, Iodates, Fæxin, Manganese Colloidal, Mang. Butyrate, Nuclein, Ol. Tereb. in Oil Inj., Stannoxyl, Sulphides, Sulphur Stearettes, Sod. Silicas intrav., Sulphurous Waters, Syr. or Pil. Sulphatum, Trilactine, Yeast, Strepto., or Staphylo. Vaccine.

Acidin : An albumen-HCl compound found useful.

Locally.—Argent, Nit., Belladonnæ Glycerin (as pigment and on poultices), Carbolated Camphor, Cataplasm Salicyl. Co., Cremor sicc. preps., Bismuth Oleas, Eupad, Hydrog. Perox., Glyc. Acid. Carbolic, Borated Hydrog. Perox., Glycerin, Iodo-Acetone, Iodine Colloidal, Liq. Sodæ Chlorinat. Diluted, Linimentum Atropinæ, Mercurome, Methysal Balm, Pot. Permang. Pencils, Sphagnol, Stanni Oleas, Sulphur Iodide, Thorii Oleat. Ung.

Subcutaneous injection in the abdominal wall of 10 Cc. Antistreptococcal Serum. Improvement rapid and complete, without destruction of tissue or scarring.—B.M.J. i./24,766.

Potassii Tart. Acid has been used as a dressing in Carbuncle.

Boils at once aborted by applying No. 88 Plaster Mull.—B.M.J. ii./26,814.

Sodium Cacodylate hypodermically on alternate days rapidly clears up furunculosis.—B. Ghosh, Ind. Med. Gaz. ; per Pres., Oct. '28,324.

Paint boils with Contractile Collodion.—W. J. Robbins, L. i./30,946—or Viodar—W. H. M.

Botulism.—A form of food poisoning. Symptoms correspond closely with those in so-called sausage poisoning met with in Germany and other countries where sausages and ham are eaten in an imperfectly cooked condition. See also B.M.J. i./18,511.

Botulism—cases of so-called—indistinguishable from types of *Polio-Encephalitis* or more accurately Meningo-myelo-encephalitis. Exemplified in epidemics of the Heine-Hedin disease.—F. G. Crookshank, L. i./18,699, see also C. H. Melland, B.M.J. i./18,559, also Wilfred Harris, L. i./18,568.

The first appearance of botulism in Great Britain was in the Loch Maree-food (sandwich) case. Bacillus Botulinus, being anærobic, could grow in a sealed tin of food, the taste and aspect of which would not be altered.—B.M.J. ii./22,481.

Botulinus Antitoxin.—Available from the Ministry of Health.

Dose.—Intravenously 20 to 50 Cc., warmed to body temperature, and injected very slowly. Repeated daily, if necessary. To be used immediately upon appearance of symptoms, also prophylactically 10 Cc. intramuscularly, to be followed by larger doses intravenously, if symptoms appear. Risk of serious symptoms from horse serum possible. If likely, a preliminary dose of 0·5 Cc. antitoxin should be given subcut.—B.M.J. ii./22,604 ; L. ii./22,732.

For the Paisley outbreak of milk poisoning due to *B. Aertrycke* see B.M.J. ii./22,728 and Vol. II.

Botulism. Outbreaks in U.S.A Patients were freely purged and received Potassium Permanganate internally.—B.M.J. i./22,893.

Botulism, also Salmonella poisoning.—W. G. Savage, L. ii./29,1107.

Outbreak in Ireland due to infected milk.—W. D. O'Kelly, Jl. Trop. Med., Mar. 15/23,95.

B. botulinus infection of canned spinach. 0·5 Cc. of infected spinach juice *per os* killed guinea pigs in 18 hours. Of 174 samples B. botulinus (Type A) was found in 6.—S. A. Koser, per Jl. Trop. Med., June 15/22,208.

Brain, Sudden Cerebral Lesions.—If gouty—Lithia, Potash with some diuretic, Nitrous Ether and Spirit of Juniper to which some Digitalis may be added—more if thrombosis is suspected than if hæmorrhage is probable.

If thrombosis be present, reduce blood coagulability, *e.g.*, by lemon juice, (*cf.* p. 250). For hæmorrhage, chalk in a little suitable acid, *q.s.* to dissolve, to increase the tendency to clotting. Calcium Lactate or Chloride best if procurable in time. Arsenic hypodermically, *e.g.*, $\frac{1}{5}$ gr. Sodii Arsen.—Gowers.

Breast, Inflammation of.—All Antipyretics.

Locally.—Belladonnæ Ext. Glycerin, and Linim.

Breath Fetid.—Acid. Salicylic, Calcii or Pot. Permang., Camphora, Cremor Magnesiæ, Creosoti Vapor, Eff. Potass. Ap. c. Sulphocarb., Formosyl Mouth-Wash, Myrrh with Borax Tincture, Formalin Tablets to suck, Thymaglycin.

Bright's Disease. See Nephritis.

Bromidrosis.—Potassium Permanganate Wash. Perfumed Formosyls.

The following said to be invariably curative.—Wash the feet, dry and dust withBoric Acid Powder, then put on a pair of socks steeped in a saturated solution of Boric Acid and dried. Powder shoes inside with Boric Powder. Each day soak the feet twice for 10 minutes in Boric Acid Solution and continue as above.

Glycerin well spread over the soles and toes before putting on the socks—

repeated as required. Successful. Prevents formation of noxious products. Swab with glucose (*q.v.*).—T. H. C. Benians.

See also **Perspiration, Offensive.**

Bronchiectasis.—Acid. Sulph. Dil., Creosote Inhaler, Hyd. Salicyl. *Diagnosis*: Lipiodol.

Bronchitis, Acute.—Aconite, Æthyl Iodide, Ammon. Acet., Liquor Antim. Tart., Apocodeinæ Hydrochlorid., Atropine Methyl Bromide, Codeine Jelly, Ether injections, Glycaphorm, Hexamine, Ipecacuanha, Ol. Cedri Atlantic, Oxygen, Papaverine, Squill preparations, Vesalvine 'S.'

Vapor Benzoin, Camphor or Eucalyptus, Counter Irritation, Ol. Succini.

Ol. Eucalypt. has been injected with Olive Oil.

Bronchitis Chronic.—Acid. Nit. dil. and Inhalations, Allium preps., Ammon. Carb., Ammon. Chlorid., Apomorph. Hydrochl., Aspriodine, Benzoates and Benzoin, Tinct., Caffeine Periodide, Calcii Sulphid., Cimcifuga, Citronin, Codeina Cough Jelly, Creosote, Dionin, Ether injections, Eucalyptus Oil, Euphorbia, Grindelia, Heroin, Iodoprotein Tabs., Ipecacuanha, Magisal, Morphine preps., Morrhuæ Ol., Morson's Soluble Kreosote, Piscidia, Potass. Cyanidum, Potass. Iodid., Prunus Virginiana, Pulsatilla, Scilla, Senega, Inf. Polygalæ Co., Syrup Picis cum Codeina, Syrupus Picis Liquidæ, Tar, Terpine Di-iodide, Terebenum purum, Terpin Hydrate, Terpinol, Tolu Balsam, Tylcalsin and Tyllithin. Vaccine of organism present, *e.g.*, Pneumo., B. Septus, B. Influenza, etc., preferably autogenous.

Antimony and Opium, Tinct. Camph. Co., and with Ipecacuanha. If much bronchial spasm and tough expectoration give decalcifying agents.—Potass. or Sod. Cit. Later tonics.

Vapores.—Acid. Carbolic, Acid. Sulphuros, Benzoini Camphoræ, Creosoti, Cyllin, Terebeni, Iodi, Croton Ol. Linim., Iodi Linim., Ethyl Iodide, Guaiacol, Nebulæ, *q.v., Oxygen* inhaled.

Bronchial Secretion is increased by:—Alkalis, especially Carbonate and other salts of Ammonium, Antimony Salts, Apomorphine, Benzoin, Camphor, Iodine, Ipecacuanha, Jaborandi, Peru Balsam, Quillaia, Senega, Squills, Sulphur, Tar, Terebene, Tobacco, Tolu Balsam, Turpentine.

Bronchocele. *See* **Goitre.**

Broncho-Pneumonia and capillary bronchitis in infants.—Mist. Paraldehyde and Potass. Iodid. Whisky in small doses. Emetine Hypod. Glucose feeding per rectum.

Broncho-Spirochætosis.—A peculiar form of bronchitis with *Sp. bronchialis*, as described by Castellani in 1905, as causal agent.

The Tartar Emetic mixtures of Castellani *q.v.* are advised.

Sub-acute and chronic cases have been treated with Lipiodol. A course of 3 to 6 injections of 2 Cc. intramuscularly. One series of injections usually sufficient, but may be repeated 2 weeks later or Iodotannic Syrup given 3 times daily for 15 days, followed by 2nd, 3rd and 4th course with one week's interval between each.—Najib Farah, Jl. Trop. Med., April 2/23,103.

Bruises.—*Locally.—Arnicæ Tinct. (well diluted), Calendula, Hamamelis, Hydrastis Tinctura, Lot. Plumbi et Opii, Hazel Foam.*

Bubo.—*Locally.—Chlori Aqua, Hydrarg. Oleat., and cum Morphina, Hydrarg. Ung., Hydrogen Peroxid., Mercurome.*

Burns and Scalds.—*Locally.—Acid. Boric Ung., Ac. Tannic (First Aid directions, see* **p.** 88), *Alcohol, Allantoin dressing, Anserine Mulls medicated, Calamin. Lotion, Acriflavine Emulsion, Carron Oil c. Menthol 2 grains per ounce, Chloretone* 10% *Ointment, Cocainæ Ceratum, Cremor Sicc. preps., Fœxin Poultice, Glycerin as an application (good), Horse Serum, Hyd. et Zinc. Cyanid. Ung., Iodised Phenol, Mastiche Benzol, Iodoform, Lanolin, Lini Ol. c. Aqua Calcis, Picric Acid (badly spoken of lately. Toxic effects.—P.J. ii./31,461), Scarlet 'R,, Sodii Hyposulph. (moist dressing), Thymol Ung., Vaseline, Zinci Oleat. Ung., Zinci Ung., Hazel Foam, Volckmann's Solution, Zinc Peroxid.*

Burns of slight extent—S.V.R. or Meth. Spirit relieves.

Thorough antiseptic cleansing of the affected part and thereafter dusting with equal parts of Boric Acid and Bismuth Carbonate (not nitrate).

Amyl Salicylate liberally poured over found excellent—*e.g.*, for Acid Burns. Anæsthetic and Antiseptic.—Boake, Roberts & Co., Ltd.

Burns 'X' Ray, see "Radiology."

Paraffin preparations, *e.g.*, that known as 'No. 7' and the proprietary Ambrine are melted and sprayed on to act as an impervious protective.

Lanolin best application for burns. 20% Vaseline may be added, followed by weak Permanganate and then Normal Saline.—L. ii./25,1238.

Favourable results with Ultra-Violet light.—C. B. Heald, L. i./25,1162.

Dressings soaked in the following solution : Standard Eusol solution 1 part (20%), 10% Saline solution 2 parts (Sodium Chloride 4%), Water 2 parts. Dressings must be thoroughly wet when applied and must be changed frequently.—W. R. Wilson, B.M.J. i./27,55.

Several layers of gauze, wrung out in hot Wright's hypertonic saline (5%), (after removal of dead tissue).—D. Mackenzie, B.M.J. i./27,421.

Waxed paper with Carbolic Oil advised.—A. Masterman, B.M.J. ii./27,590.

Acriflavine and Paraffin Wax. Flavine 0·2, Eucalyptus Oil 2, Olive Oil 5, Soft Paraffin 25, Hard Paraffin 67·8.—P.J. ii./27,451.

The toxæmia following serious burns in children is due to acidosis which may be treated by giving dibasic Sodium Phosphate, 20 to 30 grains every 4 hours, in addition Glucose in 5% solution should be given and treatment for shock carried out. Local applications which have been tried are Absolute Alcohol : Picric Acid : a mixture of Aluminium Acetate 2% in Alcohol—10 parts, with a 5% Alcoholic solution of Methylene Blue 1 part : Adrenalin 1 in 10,000 ; Tannic Acid solution 2·5%, or ointment 5%, in a basis of equal parts of Lanoline and Vaseline ; Sodium Bicarbonate 10% and Paraffin No. 7. —Prof. J. Fraser, B.M.J. i./27,1089.

Spread a thick layer of Kaolin Powder daily on the burn ; cover with Gauze and a thin layer of Zinc Ointment.—Per Pres., Oct., '29,336.

The following ointment applied on lint as soon as possible gives excellent results. Calamine 30 grains, Zinc Oxide 30 grains, Oil of Terebene 15 minims, Yellow Vaseline to 1 ounce.—J. A. Hendry, B.M.J. ii./29,1031.

Spray or paint a 1% Silver Nitrate solution on burn and expose for 1 to 5 minutes to Mercury Vapour or Tungsten Arc lamp at 6 to 20 inches distance, or to real sunlight for ½ hour. No dressings used. Repeat if necessary in 24–36 hours.—B.M.J. ii./29,668.

Pain following removal of scabs relieved by spraying with a solution of Aspirin in water.—Dickson Wright, B.M.J. ii./31,310.

Burns with Liquid Phenol.—The following did well :—Sponge with strong washing Soda (*e.g.*, 1 in about 5)—dilute Sodium Hydrate Solution might be better—cover very thickly with Ung. Acid Boric and Ung. Zinc. *p. æq.*, wrap in lint and bandage.—W. H. M.

Calculi, Biliary.—Alkalis, Ox Bile, Oleic Acid, Sodii Benzoas, Sodii Bicarb., Sodii Glycocholas, Sodii Oleas, Soap, Caps. Sod. Oleat. Co.

Cholic Acid 0·075 Gm. and Hexamine 0·225 Gm., three or four doses daily, suggested for biliary lithiasis.—Y.B.P., '27,271.

Calculi, Urinary.—Ac. Acetic, Dil. Douche, Alkaline Carbonates, Ammon. Benz. and Phosph., Aqua destillata, Calcis Aqua, Mineral Acids (for Phosphatic), Piperazina, Potass. Citras, Sodii Benz. and Hippuras, Sodii. Phos. Acid, Triticum.

Detection of by ' X ' Rays, *q.v.* Examination of *vide* Vol. II. The following draught saved a doctor's life.—Tinct. Hyoscy. ½ drachm, Chlorodyne 20 minims, Liquor Potassæ 25 minims, Aq. Camph. ad 1½ ounces. A jagged calculus was passed.—C.D.

Papaverine Sulphate 5 Cc. of 2% Solution given by a catheter has expelled.

Bladder irrigation with 15% Hydrochloric Acid (Caution : very strong !) for calculus. Patient could retain 50 Cc. for ½ hour.—B.M.J.E. ii./21,6.

Cystinuria. The formation of calculi can be controlled to a certain extent by large doses of Sodium Bicarb.—J. F. H. Stallman, L. ii./25,375.

Avoid excess of carbohydrates ; give green vegetables and fruits.—W. E. Deeks, Diet and Disease, 1927.

Cancer (for Palliative Treatment).—Alnus Glutinosa, Arsamin, Arsenic preps., Chelidonium, Chloral Hydras and Opium preps. (as sedatives), Cinnamic Aldehyde Caps., Condurango, Elixir Antimonii Cinnamicum, Ext. Violæ Liq., Goat Serum, Glucose feeding. Plumbi Acet., Sodii Cinnamas, Sodii Oleat, Sodium Fluorescein and Irradiation.

For Palliative Local Use.—Acetone, Acid. Arsenious, Acid. Carbolic. (caustic), Acid. Carbolic. Glycerin, Acid. Chromic., Acid. Lactic, Acid. Salicylic. cum Oleo, Benzole Injection, Coley's Fluid, Colloidal Copper, Colloidal Lead, Colloidal Selenium, Cupri Sulph. Pigment, Cupri Oleatis Emplastrum, Ovules and Bougies, Eusol Injected, Fibrocoumarin and Comps., Formalin plugging and injection, Glycerin intravenously with Stannoxyl as adjuvant, (Shirlaw),

Hydrarg. Nit. Acid., Liq. Hydrog. Perox. (in inoperable uterine), Injectio Antimonii, Inj. Bismuth Carb. (see Radiology), Iodic Acid, Iodinol, Iodo-Acetone, Iodoform, Lecithin Injn., London Paste, Methyl Violet, Morphine, Morphinæ Oleat., Oxygen injected suggested, Quininæ Hydrochloridi Injectio, Liquor Potassii et Sodii Hypochloritum, Quininæ Salicylas, Radium, Resorcin, Sodium Orthocoumarate, Sodii Phosphas Acid. with Hydrochloric Acid, Symphytum Cataplasm, Thoriac Comps., Ung. Thorii Oleat., Uranium Salts, *e.g.*, Oxide as Dusting Powder, Tylmarin-Thorium, Vienna Paste, 'X' Rays, Zinci Chlorid, and Pasta, Zinc Mercury Iontophoresis.

Potassium Chlorate, 10 grains in milk three times daily, and Lead Acetate ½ grain, three times daily, in cancer of the tongue.—B.M.J. ii./26,408.

Cocaine. Cancer sufferers tolerate large doses—diagnostic ?

Pituitary prolongs patient's life in cancer. It cuts off blood supply from the growth.—Per Pres. Jan. '23,13.

Goat Serum (*prepared at the Lister Institute*) *in malignant disease.*—Intramuscular injections in ½ ounce amounts produced improvements. It unquestionably attacks the growing outskirts of the tumours. The goat never suffers from cancer and it is believed that the animal's serum contains some chemical property which can resist cancer. Possible to judge whether a case be cancerous or not by condition of serum. Shaw Mackenzie's test consists in adding Sodium Oleate ; saponified and Ether extracts of cancer tissue and of cholin, respectively to the suspected serum in suitable quantities. After incubation at 37° for some 18 hours, a cloud, or ring, or turbidity appears at the junction of the fluids with carcinoma serum but not with normal and non-cancerous serum—cloud in part due to Cholesterol.—Albert Wilson, Edin. Med. Jl., May, '25,248. See also *Sodii Oleas*, p. 753.

Nitrogen in Cancer.—Nitrogen confers on protoplasm the property of instability. Liberation of Nitrogen in cancer brings about increased instability of protoplasm of the adjacent cells, leading to their more rapid proliferation. The spleen and liver are concerned with the excretion of Nitrogen compounds. Primary tumours of the spleen are rare. Its cells have power to resist the Nitrogen compounds it has to deal with. Uric Acid formed in the spleen is dealt with by the liver. Cancer for the most part occurs after middle life, when the functions of the spleen and lymphatic glands begin to fail, and Nitrogen in consequence accumulates in the blood and tissues. The protoplasm of the cells prior to that time has not been subject to irritation and fails to respond to the 'whip' (Sulphate of Ammonia must be applied to young and tender plants). Treatment, hence, would be to supply ferments normally acting on nitrogenous bodies, *i.e.*, spleen and lymphatic gland preparations. The idea was tried with Spleen Extract with promise.—J. T. Shirlaw, Pr., March, 1918.

Cancer may perhaps be caused by a fat-soluble toxin being present in the body for a long period. For a time it may be destroyed by the liver, but later fatty degeneration will ensue, the detoxicating action being lost, and free toxin is then present to attack some other tissue.—F. D. M. Hocking, L. ii./30,154.

Early rodent ulcers up to the size of a shilling treated as follows:

Ring the ulcer with Novocain 2% and firmly scrape with a sharp spoon ; the tumour comes away and a clean raw area is left. Apply a pencil of CO_2 Snow for 60 seconds and then a dry dressing. There is œdema for a day or two but practically no pain and the ulcer heals rapidly under Boric Ointment. The resulting scars are very smooth and fine. Recurrences infrequent and successfully treated by a repetition.—J. F. Smith, B.M.J. ii./28,443.

Gastric Carcinoma.—Pain disappears rapidly with adequate doses of alkali ; Orthoform locally also reduces pain, or washing out the stomach. Bismuth Subnitrate, Tincture of Belladonna, and cold compresses also of value.—E. Podolsky, Int. Jl. Med. & Surg., July, '30.

Deaths from Cancer.—Percentage increase in England and Wales from 1903–1930 compared with 1902 figures. 1903, 4·37 ; 1912, 33·91 ; 1921, 65·12 ; 1929, 104·11 ; 1930, 107·67 (provisional).—B.M.J. i./31,916.

Sodium Fluorescein Paint, Injn., etc., c. 'X' Rays. For Diagnosis, *vide* **Cancer,** Vol. II.

Cancrum Oris.—Arsenicals, *e.g.*, Galyl intravenously.

Carbolic Burns. See **Burns.** For poisoning, *vide* p. 14 *et seq.*

Carbuncle.—Small doses of autogenous vaccine may be useful in chronic stage. When operation inadvisable, locally Magnesium Sulphate and Glycerin Carbolic paste.—H. E. Griffiths, L. i./25,38. See also our pp. 539, 1033.

Cardiac Mitral Stenosis.—Oxygen inhalation. Decalcification of the blood, *vide* p. 252, *Camphor.*

Cardiac Tonics.—Adrenalin, Caffeina, Camphor, Cardiazol, Cratægus, Digitalis, Nitroglycerin, Ouabain, Pituitary (Posterior lobe), Scilla, Sparteinæ Sulphas, Strophanthus (Strophanthin intravenously), Strychnina, Thyroid, Thyroid and Manganese, Veratrum Viride.

Drugs acting upon the heart directly :—

The force of contraction may be increased by :—Apocynum, Barium Salts, Convallaria, Digitalis, Erythroplœum, Physostigmine, Sparteine, Squill, Strophanthus, Suprarenal Preps., Veratrum. *Rate of the Cardiac beat is increased by* :—Atropine, Caffeine, Cocaine, Hyoscyamine. *Both force and the number of beats are increased by* :—Alcohol, Anæsthetics, Chloroform, Ether, Quinine. *The vagus centre is stimulated by* :—Aconite, Alcohol, Apocynum, Atropine, Butyl Chloral, Chloral Hydrate, Chloroform, Cocaine, Digitalis, Ether, Hydrastis, Hydrocyanic Acid, Hyoscyamine (early in the inaction), Nicotine, Picrotoxin, Pituitary Ext. (posterior), Squill, Staphisagria (Delphinine), Strophanthus, Strychnine, Suprarenal, Veratrine.—H. W.

Digitalis is of greatest value in chronic valvular disease and in heart fatigue after acute disease or strain.—Sir R. Douglas Powell, Pr. May, '14,612.

Effect of Digitalis most striking in cases with rheumatic origin. Only called for when rapid ventricular rate leads to symptoms on the part of the patient; not called for in all cases of weak and rapid cardiac action. The therapeutic benefits are obtained when the later manifestations of heart disease have appeared not in the inflammatory or toxæmic stages.—G. A. Sutherland, L. ii./23,1222.

Auricular Fibrillation.—Digitalis, Quinidine.

Strychnine has little or no direct action. Pituitary has no direct action, but is truly a stimulant because of arteriole contraction and probably effect on capillaries. Camphor and compounds have a different foundation—detectable in failing heart. According to Trendelenburg they may be actually harmful in heart failure.—L. ii./29,1049.

Cardiac Depressants.—*Both force and the number of beats are decreased by* :—Acetanilide, Aconite, Antimony, Arsenic, Bromides, Chloral Hydrate, Emetine, Ac. HCN, Lobelia, Phenacetin, Phenazone, Pilocarpine, Veratrine.

The vagus may be depressed by :—Large doses of many of the above drugs and drugs which diminish the blood pressure such as Amyl Nitrite and Cocaine.-H.W.

Caries.—Calcii Chlorid., Calcii Hypophosph., Calcii Phosph., *Calcium Iodate.*

Caries, Dental.—Calcii Sulphidum (for Pyorrhœa), Pyorrhœa Vaccine.

Locally.—Arsenical Paste, Dental Solubes, Lanolin and Cocaine, Lactic Acid Bacilli, Paramonochlorphenol, Lotio Acidi Citrici et Phenolis, Salol or Formosyl Mouth Wash or Tooth Paste. See also Dentistry, local applications.

Essentially a post-partum phenomenon and preventive methods effectual any time throughout life. The supposition that dental caries results from structural defects due to insufficient Vitamins is completely untenable, as is shown by the fact that teeth which have been 'filled' are no more liable to caries than they were before. A tilt at 'Dental Propaganda.'—J. Sim Wallace, M.P.C., June 11, '30,497.

If J. Sim Wallace's diet rules were observed dental caries could be abolished.—D. McKenzie, B.M.J. i./30,516.

Cataract, to prevent Senile.—Iodides, Mercurials (*Hyd. Cyanid.*), Tonics.—Quinine and Iron, Strychnine, Bismutol Injns.

Cararact treated by bathing the eyes with a lotion of Calcium Chloride 4, Sod. Iodide 4, Water 500.—Br. Jl. Oph., Apl./20,192; Pres., Feb./21,72.

By washing the eyes with Mercuric Chloride 1 in 6,000 before and after Cocaine anæsthesia, sepsis is abolished.—E. R. Shetti, B.M.J. ii./30,1098.

Catarrh, Bronchial.—*See* **Bronchitis.**

Catarrh, Gastro-intestinal,—*See* **Gastritis.**

Catarrh, Nasal.—Aconite, Ammon. Chlor., Arsenic, Camphor, Cinnam. Ol., Cubebs, Elix. Cal. Chlorid., Glycaphorm, Magisal, Linctus Pini Terp. et Heroin, Mist. Anti-catarrhalis, Pilula Atropinæ Quininæ et Arsenici, Quinina, Tab. Quin. Camph. Morph. et Atrop., Tylcalsin, Tyllithin. Vaccines.

Locally.—Adrenalin, Alum Spray, Argent, Colloidal, Borated Hydrog. Perox., Camphor inhalation, Carbolised Smelling Salts, Comp. Asthma Fluid, Dobell's Solution, Ethyl Iodide inhaled, Eucalypti Oleum, Eusol, Guttæ Chlorof. Menthol Co., Liq. Alum. Format., Menthol Inhalation, Injection, Wool and Snuff, Menthol

and Camphor Inhalation, Ozonic Inhaler, Peptone Injections, Potass. Permang. as Nasal douche (very dilute), Resorcin as Nebula, Sod. Desoxycholas, Thymaglycin, Ung. Belladonnæ, Ung. Morphinæ cum Acid Tannic, Zinc Ions.

Nothing so efficient as a fine spray of Formalin Solution, $\frac{1}{4}$ to $\frac{1}{2}$% applied *early.*—Tilley. Formosyl Gargle, diluted is better.—W. H. M.

A warning against the use of nasal lavage—attacks of acute middle-ear inflammation and its complications often result from some of the injected solution passing up the Eustachian tube.—A. H. Cheatle, L. ii./25,1141.

The writer has used ***Formosyl Gargle*** to nose and throat at least twice a day for years.

In the initial state Morphine Sulphate $\frac{1}{8}$ grain or Dover Powder 10 grains at bedtime with hot gruel usually arrests. If the dry initial stage passed and the nasal fluxion thoroughly established a draught containing Opium, Ipecacuanha, Salicin, Ammonium Acetate and Camphor is useful, or substitute Spirits of Nitrous Ether for the Opium.—Yeo.

Acute nasal sinusitis. Nasal inhalation of mentholised steam for four minutes every hour or two hours. Menthol 10 grains to the ounce of Tinctura Eucalypti or Alcohol (90%) 1 drachm to be added to a jug half full of boiling water. Menthol is not suited to young children. When discharge begins freely an alkaline lotion may be sniffed or sprayed into the nose.—Sir St. Clair Thomson, Pr., Jan., 1921.

In the *shivery stage*, Dover's Powder 10 grains. For the *profuse watery discharge stage*, Tinct. Opii 5 minims every 4 hours. For the *sticky discharge stage*, give alkaline mouth-wash. For a *sore throat*, Tincture of Aconite 2 minims, Potassium Chlorate 5 grains, Solution of Perchloride of Iron 20 minims, Solution of Mercuric Chloride 10 minims, Solution of Strychnine 2 minims, Glycerin 1 drachm, Chloroform Water to 1 ounce. The dose to be used as gargle and then swallowed.—C. and D., June, 1921.

Recurrent ' colds in the head.' A daily dose of $\frac{1}{2}$ minim Liquor Atropinæ Sulphatis for 10 days is often of value.—F. Stoker, Pr., Nov. '21,348.

Parathyroid and Calc. Lact. in Spasmodic Rhinorrhœa.

Intractable nasal discharge. For offensive crusting, Iodoform 30 grains Bismuth Subnitrate 60 grains, Liquid Paraffin to 1 ounce. Subsequently Hydrogen Peroxide with equal parts Normal Saline (warm), and increase strength until stinging. Subsequently Calamine 60 grains, Glycerin 1 drachm, Water to 1 ounce.—A. Lowndes Yates, L. i./30,285.

Common cold aborted in 24 hours by one drop Tincture of Iodine or 3 to 5 drops Sodium or Potassium Iodide in glass of water. Subacute and chronic cases well treated by subcutaneous injections of Sodium Iodide solution 5% at 1 to 4-day intervals.—Per Pr., Jan. '28,65.

Catarrh, Uterine.—*Acid. Carbolic. Glycerin., Boracis Glycerin., Camphorated Carbolic Acid, Iodoform Gossyp. and Pessus, Plumbi Subacet. Glycerin. Opii et Amyli Enema, Ung. Adrenalin, Ovules (see List) and Tampons, Zinc. Sulph. Uterine Pencils, and with Alum, Zinc and other Ions.*

Catarrh, Vesical.—*See* **Cystitis.**

Cathartics.—*See* **Constipation.**

Caustics.—*Copper Salts, Nitric Acid, Potassa Fusa, Silver Salts, Sodium Ethylate and Methylate (vide Meningitis), Vienna Paste, Zinc Chloride.*

Cellulitis.—Glycerin in conjunction with Liq. Hyd. Perchlor.

Cerebro-Spinal Fever.—Antimeningo Serum.—Antim. Pot. Tart. intra., Hexamine, Opium, Phenacetin, Phenazonum, Vaccine Treatment, Flexner's Serum. See article in Vaccine Chapter.

Locally.—Liq. Iodi or Liq. Epispastic over the cervical spine.

Iodine in Glycerin as swabbing, Levick's Zinc Sulphate spray, Permanganate Spray (1 in 1,000).

Meningococcus Carriers.—*Acriflavine, Di-Chloramine T., Flavine Spray,* Cerebro-spinal Fever.—Sir H. Rolleston, L. i./19,411, 593, 645.

Persistence of Carriers.—D. Embleton & G. H. Steven, L. i./19,788. Determination of type of meningococcus.—A. S. Gordon Bell, L. i./19,887.

Intraventricular injections of serum good.—B.M.J.E. i./24,73.

Chancres., Soft.—Antim. Pot. Tart. intrav., Arsenobenzol, Bismuth Benzoate.

Locally.—Hydrarg. Flav. Lotio, Hydrarg. Nig. Lotio, Hydrarg. Subchlor., Hydrog. Perox., Iodic Acid., Iodof. Pulv. and Ung., Liq. Carb. det., Mercurome, Pb. Acet. Lotio, Resorcin.

Chapped Skin.—*Acid. Boric. Ung., Camphor Ball, Ceratum Petrolei, Collodium, Glycerin, cum Aqua Rosæ, Hazel Foam, Cucumeris Ung., Lanolin, Thorii Oleat. Ung., Ung. Phenoboric, Viodar, Zinc Cream, Zinc Oleate.*

Cheiropompholyx.—(Dermatitis between the fingers, previously called **Dyshidrosis.**)—1 drachm Formalin to a pint of water as wash for hands without drying, or eq. pts. Salicyl. and Benzoic Acids in Lanolin (15 grains a.a. to 1 oz.), or Ung. Hyd. Ammon. Dil. 10 grains to 1 oz., or Silver Nit. 2 grains in Spirit. Ether. Nit. 1 oz., applied to the papules when first appearing, often aborts.—B.M.J. ii./30,626.

The cause is usually *Epidermophyton inguinale*, also thrush (*Monilia albicans*). Treatment.—G. B. Dowling, L. ii./31,145.

Cheyne-Stokes Respiration.—Histamine has been specifically advised.

Chicken Pox, *see* **Varicella.**

Chilblains.—Calcii Chloridum, Calcii Iodidum, Calc. Lactas.

Locally.—Acid. Boric. Ung., Acid. Camphoric, Acid. Carb. Ung., Aconit. Linim., Balsam Locatelli (even if broken), Bellad. Lin., and Linim Co., Lin. Iodi et Bellad., Cajuput Ol., Calamine Lotion (extra strong), Calcis Chlorinat. Ung., Capsici. Linim., Carron Oil, Collodium Iodi., Eucalypti Ol. Ung., Glyc. Plumbi Subacet. Ung., Hazel Foam, Hydrogen Perox., Iodine Colloidal, Iodi Tinct. Decolor., Iodi Ung., Iodoform Wool and Ung. Oleanodyne, Pasta Ichthyol et Ol. Tereb., Plumbi. Subacet. Glyc., Picric Acid Sol., Thorii Oleat. Ung., Paraffin No.7. Tinct. Capsici fort. Ung. Zinci Oxidi, Viodar.

If unbroken the following may do good :—

(1) Immersion of the parts once or twice a day in warm water, with subsequent—(2) Gentle friction with Camphorated Alcohol. (3) Use of a dusting powder,—Bismuth Salicylate 1 in Starch 10, or dressings with Zinc Ointment or Lassar's Paste, Ichthyolated if required.

Paramonochlorphenol as a 2, 5 or 10% solution in glycerin or in alcohol. Ointment as follows, equally effective :—Paramonochlorphenol, 1, 2, or 5 parts; Vaseline 50 parts, Lanolin 50 parts.

Calcium Lactate seldom relieves. Thyroid and large doses of Iodine is usually of great value. Give Calcium Parathyroid and Cod Liver Oil in the thin hypotonic scrofulous patient with acroasphyxia.—H. W. Barber, L. ii./26, 311,1180.

Sodium cacodylate injections ¾ grain. Three injections at intervals of about two days good.—W. R. Grove, L. i./26,312.

Calcium Chloride, 10 grains three times daily. The Lactate not so good, and Parathyroid ¼ grain once or twice.—E. A. Milner, B.M.J. ii./26,917.

Obese people preferably treated with Thyroid and Lugol's solution, but thin people do best on Calcium.—J. F. Christie, B.M.J. ii./27,1032.

Chilblains *unbroken*—paint with *Tinct. Capsici and Lin. Camph. Co.* equal parts. For *broken—Ung. Resinæ ½ oz., Ung. Acidi Carbolici ½ oz., Zinc Oxide* 2 drachms, Vaseline to 2 ounces.—T. M. Hovell, B.M.J. ii./19,668.

For irritation. Liq. Plumbi Subacet. Fort. 2 dr., Lin. Camph. Ammon. 6 dr., Ol. Sinapis Essent. 2 m. Shake in a bottle. To be freshly made.

A very strong *Salicylic Collodion* (1 in 8) excellent.—Sir G. A. Reid, Clin. Jl., Dec. 26/23,617.

Chloasma.—*See* **Freckles.**

Chlorosis.—Arsenic, Arsenic and Iron Injection and Drops, Iron Salts, Hypophosphites, Manganese Salts, Marrubin, Myrrh et Aloes Pil., Phosphorus, Santonin, Sirop Neurotonique, Sodii Persulphas, Trilactine.

Diminish fluids in the body by Caffeine, Magnes. Sulph., Zinc Sulph.

Suppress menstruation by hot injections or Amyl Nitrite.

Cholera.—Atropine injection, Calc. Permang. (with Hypertonic Saline), Camphora, Carbo Animalis, Charbon Naphtolé, Charkaolin Granules, Chloromorphiæ Liq., Copper Salts, Coto and Cotoin, Erythrol Nit., Helba, Hyd. c. Creta, Hyd. Subchlorid. c. Opio, Hydrog. Perox., Hypod. injections of Quinine, Kaolin, Mannitol Nit., Menthol (for vomiting of), Morphina, Nitroglycerin, Ol. Allii Essent., Opium, Plumbi c. Opio Pil., Resorcin, Salol, Sedeff, Sulphurous Acid, Tinct. Capsici or Cayenne in Brandy, Tinct. Chlorof. Co., Tribromophenol-Bismuth.

Nitrates, the sheet anchor, following on intravenous injection of hypertonic saline to combat the collapse stage.—G. B. Sarkar.

Tannin rectal injection, Saline Solution rectal injection, Cholera Vaccine, *cf.* Multiple Vaccines, Cholera and Typhoid, also *Tetra, Penta* and *Hexavaccines* or Glucose, Subcutaneous and Intravenous Injections.

In the *evacuation stage*, Opium is largely used. Some hold it is dangerous. Combined with acids and carminatives it can cut short the disease. Kaolin —an ounce hourly in a glass of water. ***Tomb's Essential Oil*** mixture is successful: Aniseed Oil, Cajuput Oil, Juniper Oil, of each 5 m., Aromatic Sulphuric Acid 15 m., Spirit of Ether 30 m. Of this ½ drachm doses in an ounce of water every ¼ hour for 2 or 3 hours. Doses vomited should be repeated. Carminative, stimulant, and astringent, quickly arresting diarrhœa; it is *safe* to give to unintelligent persons. For *collapse stage*, 3 to 4 pints isotonic Saline, with 60 grains of Sodium Bicarbonate per pint added, intravenously, at the rate of 2-oz. per minute. Hypertonic Saline (Rogers) not specific. Rectal injections of Hyperalkaline Saline (with 120 grains Sodium Bicarbonate) should be given where collapse has been overcome but suppression of urine still persists. The essential oil mixture, one drachm three times a day, during epidemics affords almost absolute protection.—J. W. Tomb, L. ii./26,722.

Undoubtedly preventive and cure, and will clear up typhoid in 24 hours.—A. Cannon, B.M.J. i./27,98. See also G.O.F. Sealy, B.M.J. i./22,918. It is no use after collapse. Pungency obviated by giving ½ dr. every ¼ hour in ounce of water. Sucking ice minimises tendency to vomiting.—J. W. Tomb, I.M.G., Mar.'26,155.

Cresol 4 minims, Aromatic Sulphuric Acid 5 m., in water 4 oz. (less doses for children). Give every ¼ hour for 8 doses and every ½ hour for a further 4 doses, after which the acid is omitted, and Cresol alone in same dose continued at hourly intervals for another 12 doses, at 2-hourly intervals for another day, and at 3-hourly intervals on the third day.—F. J. Palmer, I.M.G., April, 25,155.

Cholecystitis.—*See* Gall Bladder.

Cholelithiasis.—*See* **Gall Stones.**

Chordee.—Aconite, Belladonna, Bromides, Camphora, Cannabis, Canthar, Tinct. (one minim hourly), Chloral Hydras, Hyoscine, Hyoscyamine, Morphinæ inj. hypod., Opii Suppos.

Chorea.—Actæa, Adalin, Antimonials, Arsenic, Bromides, Aspirin, Asprio-dine, Brominol, Bulbocapnine, Cacodylates, Cannabis and Chloral. Calcii Chlorid. or Lactate, Calcii Phosph., Camph. Monobrom., Chloral Hyd., Cimici-fuga Ext. Liq., Codeine, Conium and Coninæ Hydrobrom., Ferri Bromid., Ergot, Ferri Phosph., Formates, Hexamine intrav. (of children), Hyd. Perchlor., Gel-sem. preps., Iodides, Iodoprotein, Magisal, Mag. Sulph., Morrhuæ Ol., Nirvanol, Nitroglycerin Tabellæ, Phosphorus, Physostigmine, Salicylic Acid, Sedasprin, Sod. Salicyl., Strychnine, Sulphonal, Tylcalsin, Tyllithin, Valerianates, Zinc. Brom., Sulph. and Ox.

Calcium Chloride intramusc. and Parathormone gave benefit, the latter in a dose of 4 minims twice daily for a child of 4, 5 minims for a child of 7, and 6 minims for one of 10 years.—E. C. Warner, L. ii./30,719.

Chromium Dermatitis and Ulcers.—*See* **Chromium.**

Cicatricial Tissue.—Cicatricine, Iodolysin, Injection Thiosinamin et Sod. Salicyl., Ung. Thiosinamin et c. Phenazon, Urea.

Cirrhosis of Liver.—Ammon. Chlorid., Iodides, Acid Nitro-hyd. Dil., Calcii Chlorid., Calcii Lactat., Sodium Phosphate.

Climacteric Disorders see **Menopause.**

Cœliac Disease.—Clinical features. Treatment a high protein diet with only moderate carbohydrate and very low or absent fat, with vitamins, salts and water. Skimmed milk powder, to which powdered Casein (Casec.) is added. Bovril added later, and late, small amounts of carbohydrate.—Prof. L. Parsons, L. i./31,61.

Cold, Common.—See **Catarrh, Nasal.**

Colic, Hepatic and **Renal.**—Opium, Morphine, Belladonna (in large doses), Papaverine (Biliary), Amyl Nitrite, Chloroform, or Ether Inhalation.

Colic, Intestinal.—Æther, Benzyl Benzoate, Calcis Aqua (for infants), Cajaput Ol., Camphora, *Cannabis*, Chloroform, Chloromorphiæ Liq., Elixir Gent. Acid., Menth. Pip. Ol., Morphine, Opium, Tinct. Carminativa, Bromides, Chloral, Hyoscyamus, Peppermint, Ruta, Valerian.

Colitis.—Aperfine, Bism. Salicyl., Hydrastis, Isphagula, Kaolin, Methylene Blue, Naphthalene, Naphthalene Tetrachlor., Psyllium, Salicylates, Salol, Sod. Ricinoleat, Thymaglycin, Trilactine, Vaccinum Myrtillus, *B. Coli* Vaccines.

Saline and Boric Enemata Copper Sulphate injection, *Oils*, Thymaglycin. Glucose, Subcutaneous and Intrav. Injection. Zinc and other Ionisation.

Colitis, Mucous.—Bismuth Sod. Salicyl-Salol Pil., Carbo. Enema Bism. et Sod. Salicyl., Emulsio Paraff. c. Bismuth et c. Pancreatin. Astringents, *e.g.*, Tannin and Nitrate of Silver, and sedatives, *e.g.*, Bismuth Salts, Kaolin, Salol, *B*-naphthol and intest. antiseptics, Sod. Ricinoleat, Vaccinium Myrtillus. *Saline Transfusion.*

Empty colon by lavage. Bismuth (2 ounces) in bread and milk every week. Where much fermentation add an ounce of Charcoal. For clearing the bowel Castor Oil.—Lord Dawson of Penn.

Antidysentery Serum in large doses intravenously miraculous. 40, 60, 80, and 100 Cc. on successive days, and then 100 Cc. for a few additional days.—A. F. Hurst, B.M.J. ii./26,990. Colonic lavage c. Dimol.

Colitis, Ulcerative.—Anti-dysent. Serum, Bism. Carb., Calc. Sulphid. Stearettes, Ipecac., Methylene Blue, Pot. Permang., Silver. Vaccines.

Enema Bismuth. Subgallat., Ol. Morrh. c. Cresot., Emulsio Sulphuris injected through an artificial anus.

Direct treatment of the colon essential. Starch and Opium enema, simple colonic washes with Sod. Chlor. 1 drachm to 1 pint or Sod. Bic. 2 drachms to pint. Albargin Enema, 20 grains in 30 ounces Normal Saline, increased to 30 grains.—H. L. Tidy, B.M.J. i./30,135.

Zinc Sulphate ionization. ½% up to limit of tolerance, with a special flushing electrode. At first only a little may be tolerated with 2 or 3 m.a. of current, but finally 3 pints may be held with 20 m.a. for 15 minutes or longer.—J. Burnford, B.M.J. ii./30,640. See also J. Curtis Webb, B.M.J. ii./30,757.

Charcoal, Tannin locally (1 or 2 grains to 1 oz.) given after preliminary lavage with low pressure by means of a soft catheter: Hyd. Perox. 1 dr. to the pint without lavage may be better than Tannin. Anti-dysentery Serum.—A. F. Hurst, B.M.J. i./31,693; L. i./31,636.

Collapse and Fainting.—Adrenalin, intracardiac inj., Æther hypod., Æther Spt., and Spt. Co., Alcohol, Ammon. Arom. Spt., Ammon. Vapor, Amyl Nitris., Camphor Inject., Capsules Aromat., Ammonia, Cardiazol, Curschmann's Solution, Digitalis and Inj. Hypod., 20 m., Erythrol Nit. Tabs., Mannitol Nit. Tabs., Nitroglycerin Tabs., Oxygen and Alcohol, Sal. Volat. For Rectal Feeding, see p. 395.

Post-operative collapse. 0·1 Gm. Ephedrine in 1 litre of Saline intravenously slowly until blood pressure steady.—B.M.J.E. i./30,16.

Comedones.—Fowler's Solution. *Locally.—Ac. Carbolic, Calamine Lotion, Calx Sulphurata, Resorcin, Vaccine Staphylo. See also Acne.*

Conjunctivitis.—*Locally.—Acid. Boric, Acriflavine, Alumen, Alum Aceto-Tart., Argenti Acetas, Argenti Fluoridum, Argent. Iodid. Recent, Argenti Nitras, Argyrol, Belladonna, Borax, Colloidal Silver and Mercury, Coll. Adstring. Lut., Cuprung, Hyd. c. Morphina Oleat, Hyd. Oxid. Flav. Ung., Hyd. Perox., Mercurome, Resorcin, Zinc. Acetat. vel Sulph. Lotio, Zinc Ions.*

Sodium Bicarbonate in warm 3% solution is the most generally serviceable cleansing solution in treatment of blepharitis.—R. A. Greeves, L. ii./23,997.

Conjunctivitis, Diphtheritic. ***Locally.—Formaldehyde, Hydrog. Perox., Iodol, Quininæ HCl. vel Sulph. Lotio., Resorcin, Methylene Blue.***

Corrosive Sublimate 1 in 8,000—eyes washed every 2 hours. Lids painted c. Silver Nitrate 2%.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,45.

Constipation.

(1) ***Laxatives:***—Agar, Aloes, Aloin, Aperfine, 'Bitter-free Cascara,' Calomel, Cascara (Capsules, Elixir, Jelly, Mistura Laxativa, Pastils), Castor Oil (useful with Glycerin *p. æq.*), Emulsio Paraff. c. Rhamno Frang., Fæxin, Maricol, Elix. and Syr. Ficorum, Felamine, Guaiac. and Sulph. Tabs., 'Hindu Dates,' Maltaffin, Mist. Cascara Co., Ol. Olivæ, Oleum 'Elliott' Capsules, Ol. Ricini Aromat, Paraffagar, Paraffinum Liq. and Molle, Eff. and Tablets Phenolphthalein, Pil. Cascara Co., Prunol Prune Jelly, Pulv. Glyc. Co., Rhamnus Frangula, Rhubarb preps., Senna (Elixir, Conf.), Sodii Hyposulphis, Sulph. Conf., Tinct. Laxativa, Trilactine Tabs., or Milk.

Tab. Phenolphthalein with Hyd. c. Creta *aa.* 2 gr. is a useful combination.

(2) (*a*) ***Secretion Stimulants.***—Ammon. Chlor., Jalap and preps., Magnes. Chloride and Cit., Normal Saline (1 pint) *mane sum.* Saline Waters, Seidlitz, Sodii Chlorid., Sodio-Magnes. Eff., Sodii Phosph. Eff., Sodii Sulph. Eff. (*b*) ***Hepatic Stimulants.***—Aloes, Colocynth, Ipecac., Iridin, Jalap, Mist. Hepatica, Podoph., Rhubarb, Sodii Glycocholas, Sodii Sulph., Elixir Gent. Acid. (*c*) ***Cholagogues***—Blue Pill, Calomel, Fel Bovin., Euonymin

(action thought to be by relieving the intestine), Grey Powder, Magnes. Chloride, Ol. Menth. Pip., Pilulæ Laxantes, Scammony (Pil. Conf.), Taraxacum preps.

Bile is the surest cholagogue, but Turpentine, Sod. Benz., Sodium Salicyl., Euonymin, and Podophylloresin, possess a moderate effect.—Dixon.

(3) ***Peristalsis, Excitants of***—Choline HCl, Ignatia, Nux Vomica, Senna, Strychnine, Pil. Bellad. Nucis Vom. et Cannabis.

(4) ***Spasm Relievers.***—Asafœtida, Belladonna, Bromides, Chloral, Hyoscyamus preps., Peppermint, Valerian.

(5) ***Nerve Tonics.***—Arsenical preps., Caffeine, Quin. Ac. HCl Suppos., Sodii Glycerophosphas, Zinc Valerianas.

Pil. Hydrarg. Subch., Rhei, Cascara, et Capsicin would have combined effect.

Pituitary Extract has been used to counteract intestinal toxæmia.

Enemata and *Trilactine, Injection and Suppositories. Fel Bovinum Gauze Tampons coated with Soap are used.*

Hypodermic Purgatives.—Aloin, Apocodeine, Colocynthin, Hormonal, Physostigmine.

Intestinal Paresis.—*Enema Ammoniæ.*

Contraceptives, see p. 722.

Convulsions.—Amyl Nitris, Anæsthetics, Camph. Monobrom., Chloral, Chloral and Morphine, Chloroform, Conium, Morphine, Moschus, Podophyllin, Pot. Acetas, Pot. Brom., Rue, enema of—(for infantile), Urea-Bromine, Santonin, Sodii Brom., Sodii Nitris, Syr. Pilocarpin. et Pot. Brom.

Chloral Suppositories.

Convulsions, Puerperal.—*See* **Eclampsia.**

Cornea, Inflammation, and Ulcers of. *Locally.—Argent. Iodid. Rec., Atropine, Belladonna, Boric Acid, Cocain. Hydroch., Duboisine, Eserine, Fluorescein (diagnostic), Iodi. Tinct. (Cocaine before and after painted on), Scarlet R. and Atropine in Castor Oil, Hyd. Oxid. Flav. Ung., Hyd. Subchlorid., Inf. Abri, Pilocarpine and Quinine Lotion, Mercurome.*

Dionine 5% useful, see p. 558. Hyd. Oxycy. Injections, see p. 461. Phenol Camph. applied with match, see p. 16. Mag. Sulph. up to saturated solution, see p. 539.

Corneal ulcer well treated with an ointment containing Atropine and Yellow Mercuric Oxide of each 1%.—P. G. Doyne, L. ii./27,132.

Corneal Ulcers respond well to ultra-violet light.—W. S. Duke-Elder, M.A. '31,119.

Successfully treated with Atropine and bandage and silvering of the lids. Septic and hypopyon ulcers are cauterised with Camphor and Carbolic (equal parts) and paracentesis of anterior chamber repeated as required. Iodine injections intravenously hasten cure.—E. R. Shetti, B.M.J. ii./30,1098.

Corns. *Locally.—Acetic Acid (glacial), Carbolic Acid, Collod. Callosum, Cupri Oleas, Fowler's Solution of Arsenic, Formalin, Lin. Iodi., Ung. Iodi Intinct., Iodum Oleatum, Salicylic Ions, Thorii Oleat. Ung.*

Corns, Soft. *Locally.—Durine, Perfumed Formosyls, Silver Nitrate Solution 1 in 3 applied every 4 or 5 days.*

Coryza.—*See* **Catarrh, Nasal,** and **Hay Fever.**

Cough.—Acid. Hydrobromic, Acid. Hydrocyanic, Bellad., Camph. and Creosote inhaled, Camph. Co. Tinct., Chloral Hyd., Codeina and Periodide, Conium, Cynoglossum, Elixir Pectorale, Elix. Pini Terpin et Diacetyl Morph., Gee's Linctus, Gelsemium, Glycaphorm, Guttæ Rosæ, Hyoscyamus, Lichenoids, Linct. Camph. Co., Linct. Expectorans (Antimonii), Linct. Menthol, Linct. Morph. Comp., Linct. Morph. Hydrocyanicus, Linctus Terp. Heroin Co., Linct. Thymi et Diaphorm., Pastilli Pectorales, Ozonic Inhalers, Liq. Pectoralis, Marrubium, Mist. Apomorph. Co., Mist. Tussi Rub., Morphinæ Linctus and Troch., Morphinæ et Ipecac. Troch., Opium preps., Pastilli varii, *q.v.*, Picis Liq., Pil., Prunus Virg., Rami Syrup, Spirit Chlorof., Syr. Coccillanæ Co., Syr. Ferri Iodid., Syr. Pini Pumil., Syr. Thymi c. Diaphorm, Tab. Formalin, Tabellæ Glycyrr., Terpin Hydrate, Terebenum, Terpinol, Troch. Tussis, Tinct. Benzoin Co., Tylcalsin, Tyllithin, Vapor Creosot. Co. (Phthisical cough).

Post-influenzal Cough.—Ammon. Iodide with Tinct. Benz. Co., with counter-irritation by a stimulating liniment to front of the neck.—Eric Pritchard, B.M.J. i./31,725.

Sir F. Semon's scrip: Morph. Hydrochlor. ¾ grain, Apomorphine Hydrochlor. ½ grain, Acid. HCl, Dil. 10 minims, Syrup of Figs 4 drachms, Syrup

Pruni Virg. 2 drachms, Water to 6 ounces. 1 to 2 drachms every hour. Biological antagonistic action of Morphine and Apomorphine. Good for all spasmodic coughs.—H. C. Semon, B.M.J. i./31,769. The cough may be attributed to a pharyngitis. Glycerin Tannin Paint good.—W. A. Marris, *ibid.*

Mercury Vapour Lamp the only remedy any good. Internally, Syr. Bromoform for children, or Elix. Bromoform for adults.—G. Richardson, B.M.J. i./31,686.

Cretinism.—Thyroid Preparations. 'Three Gland' and 'Four Gland' Elixir and Tablets. Suprarenal gland.

Cystitis.—Acid Camphoric., Acid Lactic, Aconite, Alkalis, Ammon. Benz., Betol, Belladonna, Benzoates, Boric Acid, Buchu, Collinsonia Can., Copaiba, Gokhru, Hexamine, Hydrastis, Juniper, Liquor Potassæ, Magnesii Boro-Citras, Pareira, Pyridium, Salol, Sod. Salicyl, Sorghum, Triticum repens, Uva Ursi, Vesalvine 'B' and Vesalvine 'S', B. Coli or appropriate Vaccine.

Locally.—Argenti Fluorid., Iodidum and Nitras, B. Ac. Lactic, Irrigation, Cocaine Lactate, Colloidal Mercury and Silver, Creolin Solution, Iodine Douche, Formosyl, Mercurome, Quin. Bisulph. 1 *in* 2,000, *Zinc Sulphanilas.*

Treatment Notes: Drinks containing Pot. Citrate., Conf. Senna and Conf. Sulphuris *p. æq.* Phenacetin and Ext. Hyoscyamus in 5 grain doses, and if pain very acute and vesical tenesmus present a rectal injection of 2 drachms of Starch containing Antipyrin and Laudanum. Urinary antiseptics as the inflammation declines. *Locally.*—Dilute Boric Acid Solution useful. If chronic, Silver Nitrate 1 grain per ounce carefully instilled (in a child 3 ounces may be used and left in the bladder). When the vesical end of the mucous membrane of the canal becomes involved the passage to be swabbed out with Liq. Phenol through a speculum and immediately washed with Sodium Bicarbonate Solution to check action.

Acute Cystitis.—Phenacetin and Ext. Hyosc. 5 grains each *t.d.*, Appropriate Vaccine. Local Treatment.—Instillations, irrigations with Permanganate 1 in 2,000, Protargol, etc.

Cystitis, chronic.—Ammon. Benz., Buchu, Cinnamates, Grindelia, Hexyl-Resorcin, Juniper, Salol, Sandal Wood, Santalol Caps.

Locally.—Eusol, Hydr. Perox. (5 *to* 10 *Vol.*), *Mercurome, Quinine.*

Croup, False.—*See* **Laryngismus Stridulus.**

Cystinuria, *see* **Calculi.**

Dandruff, *see* **Seborrhœa.**

Deafness.—Pilocarpine, Otosclerol. *See also* **Earache.** In old people, Thyroid Siccum ½ gr. twice daily.

For deafness hot baths containing a lb. of Magnesium Sulphate is sometimes effective in a minority of chronic cases. To be used with caution in elderly people. 10 minutes' immersion enough. Exhausting. Treatment by the enunctories is an old-established method.—J. Adam, B.M.J. i./31,621.

Debility.—Acidin, Alcohol, Aperfine, Arsenic preps., Bismuth and Pancreatin, Bone Marrow Extract, Bovril, Calcii Hypoph., Syr. Calcii Phosph., Calc. Glyceroph. c. Lacte, Caps. Valerianat, Catha Milk and Glyceroph., Cinchona preps., Conf. Glyceroph. Co., Elixir Ferro-Manganes. Pept., Elixir Gent. Acid., Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrh. c. Lecithin, Ferrocarnis, Formates, Glycerophosphates, Glycerole Hypoph., Hæmoglobin Capsules, Helba, Iron Salts, Lacidac, Lecithin Pulvis, Liq. Pepsinæ et Caffeinæ, Maltum, Malted Glyceroph., Marrubin, Malt Ext. c. Hæmoglobin, c. Pancreatin, c. Hypoph., Malt Ext. cum Syr. Ferri Phosph., Morrhuæ Ol., Phosphorus, Pil. Potentin Co., Pil. Lecithin c. Ferri Iodid., Pulv. Glyceroph. Co., Quassia, Quinine preps., Sirop Neurotonique, Sod. Cacodyl., Strychnine, *e.g.*, Cacodyl. and Formate, Syr. Ferri Phosph. c. Quin. et Strych., Syr. Format. Co., Syr. Kolæ Comp., Syr. Glyceroph. c. Format., Tylmarin, Trilactine. See also **Anæmia.**

For overwork: 2 minims of Tinct. Digitalis thrice daily for lengthy period. —'D.M.' in M.P.C., Oct., '26,1927.

Delirium Tremens (and *see* **Alcoholism**).—Ammon. Carb., Apomorphina, Bromides, Camph. Monobrom., Capsicum, Chloral, Colloidal Gold, Digitalis, Elix. Quinidine, Hyoscine, Hyoscyamine, Opium preps., Paraldehyde, Phosphorus, Quinine preps., Sod. Brom. Intrathecal injection, Sod. Chlor. injections, Strychnine, Sulphonal, Valerianates.

Hyoscine, Sulphonal and Veronal in.—R. Eager, B.M.J. i./20,114.

Dementia Præcox—treatment.—T. Beaton, L. i./25,1145,1197. Sulfosin Injns.

Dengue Fever.—Sod. Salicyl., Salicin, Pot. Iodi., Phenacetin and Caffeine.

Dentistry.—*Locally.—Alcohol Sandarachi, Borated Hydr. Perox., Butyn, Cinnamon Paste, Cocaine Lanolin, Cocaine-Menthol-Phenol, Coll. Alk. Astring., Formalin, Copal Solution, Dental Anæsthetic, Compo, Rubber, Wax, Emp. Capsici, Eucaine Lactate, Erythrophleine, Gossyp. Arsenios., Hyd. Perox., Iodoform Paste, Formosyl M. W., T. P., and Dressing, Mercury Amalgam, Pasta Arsenicalis, Zinc Oxychlor., Phosphate, Sulph.*

For use after anæsthetics.—Amyl Nitrite. *Vide* also Chloroform, etc.

Derbyshire Neck.—*See* **Goitre.**

Dercum's Disease.—Thyroid (*q.v.*).

Dermatitis. *Locally.—Liq. Alum. Acet., Acid Boric Lotion, Anserine Mulls, Mang. Butyrate, Paraffin No. 7, Perf. Formosyls, Pot. Permang., Ung. Ac. Salicyl* 50%, *Ung. Rusci Co., Carbolised Zinc Ointment.*

Industrial dermatitis—bakers' itch, sugar itch, water rashes, Formalin dermatitis, from cutting oils, Tar, etc.—Hall Stewart, B.M.J. i./22,498.

Dermatitis exfoliativa neonatorum, pemphigus neonatorum (Ritter's Disease). A fatal case.—R. McDonald Cairns, B.M.J. i./23,186.

Dermatitis venenata caused by latex of plants or appendages.—C. Pardo-Bastello, Jl. Trop. Med., June 1/23,202. Strong soaps and permanent hair-waving bad.—R. Labouraud, L. i./23,1318.

Arsenical dermatitis.—Contramine, Sodium Thiosulphate locally.

Bakers' dermatitis.—All minor cracks, abrasions, etc., should be at once treated with Iodine or Silver Nitrate. Metchnikoff's Ointment (Mercury Subchloride 33% in Anhydrous Lanolin) most satisfactory, applied freely, rubbed in, and covered to exclude air. Evacuation of the vesicles hastens healing. All cracks are painted with Silver Nitrate, 15 grains to the ounce of Spirit of Nitrous Ether, before applying ointment.—N. Howard Mummery, L. ii./25,647.

Lime dermatitis.—Frequent changes of dust-laden underclothing, alteration of employment, and nightly application of emollient grease to skin of face, hands, and arms. Over-sweating or abnormal dryness are predisposing factors.—W. J. O'Donovan, L. i./25,599.

Dermatitis among painters.—Paint solvents can cause the irritating vesicular eczema, Turpentine, Thinner and Naphtha being the worst.—J. A. Turner, L. ii./25,1033.

Chromium dermatitis.—B.M.J.E. ii./25,51.

Metol dermatitis.—See p. 307.

Dermatitis due to dyed fur.—Get rid of the fur and use Zinc Oxide cream.—A. C. Roxburgh, Pr., May, '25, per P.J. i./25,590. See also Paraphenylenediamine, p. 306.

Dermatitis 'X Ray' (*Local use*).—Boric Acid Ointment, Radium. See also Eczema, Psoriasis, etc.

Keratosis accompanying.—Carbonic Snow.

Dhobie's Itch.—Manson says produced by *Microsporon minutissimum* and is really inflamed erythrasma and not trichophyton ringworm.

Vleminckx's Solution cures—used at first diluted three or four times.

Rub areas with a 10% solution of Chrysarobin in equal parts of Acetone and Methylated Spirit. In the evening wash off and use a 5% Benzoic Acid and 3% Salicylic Acid Ung. Next day reapply the Chrysarobin.—A. Whitfield, L. i./23,1125. Unguentum Resorcin et Ac. Salicyl (Castellani) is popular.

Dhobie's Itch Ointment (Deeks) for itch and pruritus ani.: Salicylic Acid 20 gr., Mercury Ammoniat. 20 gr., Bismuth Subnit. 1 dr., Eucalypt. Oil 1 dr., Adeps Lanæ (Anhyd.) to 1 ounce.—W. E. Deeks, U.F.C., '25,256.

Relapses with the Itch Ointment prevented by a powder of ½ oz. Sod. Bic. in 8 oz. Talcum powder.—R. C. Connor, Int. Conf. Int. Am., '24,498.

Diabetes Insipidus.—Arsenic, Adrenalin, Belladonna, Ergot, Gallic Acid, Lithium Salts, Lithion, Opium, Pituitary Injection.

Diabetes Mellitus.—Insulin. Diabetic Foods.

Glucose per rectum especially where acidosis threatens. Pituitary Extract. *Lactose* (*q.v.*) is stated to be assimilated by diabetics.

Allen's Dietetic Treatment.—Regulated fasting and gradual dieting—metabolic processes are given chance of recovery. In dieting it is now understood the proteins and fats might be deleterious as well as the carbohydrates.—Sir A. Garrod, B.M.J. ii./21,706. *See also* P. J. Cammidge, B.M.J. i./17,503.

Of 143 cases treated by fasting 52 died.—P. J. Cammidge, B.M.J. ii./21,708.

Ætiology and Treatment.—P. J. Cammidge, Pr., June 22/396.

Negligible glycosuria.—O. Leyton, Pr., Jan. 1922, p. 113.

Glycosuria of malarial origin. A case with 0·85% Glucose cleared up on treatment with Quinine. Another case starting with 2% Glucose was evidently chronic malaria though parasites were not found. Strict diet. Finally under intensive Quinine treatment with ordinary diet the sugar disappeared.—A. Castellani and J. Graham Willmore, B.M.J. ii./21,286. See also G. A. Harrison, *ibid.* 630.

A diet of 900 calories, mostly fat, produces the same fall in B.M.R. as fasting—less dangerous and more successful in desugarization.—L. H. Newburgh and P. L. Marsh, per Jl. Trop. Med., June 15/23,224.

Amino-Acids Content, Significance of. *Vide* Amino Acids, Vol. II.

Restrict diet to animal proteins, leafy green vegetables and fresh fruits. More Insulin is given than necessary.—W. E. Deeks, Diet and Disease, 1927.

Further refs. Edn. XIX., p. 1052.

Van den Bergh Reaction.—In diabetes mellitus. In 130 patients liver injury was absent in only 34. Routine performance of the test may assist in prevention of diabetes.—Brit. Jl. Exp. Path., June, '26,155, per Pres., Jan., '27,13.

Coma of :—*See also* ***Insulin.***

Hypertonic Saline and Gum Acacia.

Exceedingly large doses, *e.g.* 500 Cc. of 5% Sod. Bic. intrav., also Sodium Bicarbonate 40 Gm., Levulose 30 Gm. in water, 1,000 Cc. by drop enema.

Langdon Brown's Mixture for control of acidosis : Sod. Bic. 1 drachm, Pot. Cit. 30 grains, Calc. Lact. 5 grains, Mag. Carb. 5 grains, Chlorof. Water to 1 ounce.

Action of Alcohol on blood sugar in diabetes. A dose of Brandy is capable of lowering the fasting blood sugar in a diabetic—this is brought about after absorption into the blood stream. Of value in diabetic coma.—J. C. Hunt, L. i./30,121.

Theories of ketosis and acidosis as a cause of diabetic coma are not supported by the amounts of Aceto-acetic Acid and the alkali reserve content of the blood.—E. C. Dodds and J. D. Robertson, L. i./30,852.

Diagnosis of diabetes mellitus. Should be based on a very considerable loss in power of storing and/or burning sugar, or evidence that the power is decreasing.—O. Leyton, L. i./30,1168.

For the **thirst of** :—Pastillus Acidi Citrici c. Limone.

Diaphoretics.—

Acting peripherally :—Nicotine, Pilocarpine. *Warmth* (local application) and Alcohol (internally) perhaps act in the same way in addition to their vascular action. *Acting centrally* :—Ammon. Acet., Amm. Cit., Antim. Salts, Ipecac., Opium. *Mode of action doubtful* :—Pot. Acet., Pot. Cit.,—*and feeble* :—Aconite, Colchicum, Lobelia and Salicin. *Anhidrotics* or *Antihidrotics.*—Acting peripherally,—Atropine by acting on the ends of the nerves in the glands, Agaricin, Hyoscyamine, Stramonium. Cold (local application). *Mode of action doubtful.*—Acids, Nux Vomica, Picrotoxin, Quinine, Zinc Salts.

Diarrhœa.—Acid. Camphoric., Carbolic., Gallic, Hydrochloric Dil., Lactic., Sulph. Dil. and Aromat., Agaricus albus and Agaricin, Anthemidis Tinct., Benzonaphthol, Benzyl Benzoate, Bisciniod, Bismuthi et Cerii Salicyl., Bism. Salicyl. Tannas, Cajuput Oil, Calc. Carb., Calc. Salicyl.,Camphora, Catechu, Charkaolin Granules, Cinnamon, Cloves, Conradi's Drops, Coto, Cotoin, Cretæ Arom. Pulv., and cum Opio, Cupri Sulph., Cyllin Syrup, Eucalypt. Gum, Liq. Ferri Pernit., Ferri Salicyl., Guaiacol Carb., Hæmotoxylin, Hyd. Perchlor., Hyd. Subchlor. (large doses, *q.v.*), Ipecac., Kaolin, Lacidac, Mist. Antiseptica, Mistura Diarrhœa, Naphthalin, Naphthol, Opium preps., Plumbi Acet., Pulv. Ipecac. Co., Pulv. Kino Co., Quin. Salicyl., Resorcin, Roseberry's Mist., Ricini Ol. and Aromat., Sedeff, Silica Gel., Sodii Phosph., Sod. Salicyl., Syr. Ægle Marm. Co., Thieleman's Mist., Sodii Sulph., Trilactine Tablets or Milk, Tylcalsin, Tyllithin, Whey Powder, Zinc Sulphocarb.

Acid. Tannic, Suppos., et cum Opio, Amyli Enema, et cum Opio, Gallœ Suppos. et cum Opio, Tannin rectal injection, Turpentine Stupes. See also Dysentery.

Diarrhœa Infantile.

Saline injections either by the skin or bowel are of great and saving value in acute summer diarrhœa.—W. J. Tyson. Calomel in large doses has been advised. *See also* A. V. Neale, B.M.J. ii./31,382. *See also* Cœliac Disease.

Diarrhœa of Phthisis.—Coto and drugs as for diarrhœa, *q.v.* Kaolin. Bism. Carb., *e.g.* 4 drachms to 2 ounces in milk.

Calc. Chloride, ½-1 grain intram. or intraven. at intervals of 2 or 3 days with Bism. Carb. *per os*, say 1-2 drachms thrice daily. Injections should be continued for 2 or 3 weeks.—F. Savy, L. ii./25,674,781. A. F. Hurst recommends Ac. HCl. dil. 30 to 60 minims with each meal.—*ibid.* 727.

Diphtheria.—Acid. Salicylic., Aconite, Antitoxin, Ferri Perchlorid., Kaolin, Sodii Benzoas, Sodii Chloras, Sodii Hyposulphis, Toxin-Antitoxin Mixture as prophylactic. Normal Saline (in grave toxæmic states).

Locally.—Acid. Benzoic. Nebula, Acid. Carbolic. Glycerin, and Nebula, Acid. Lactic Nebula, Acid. Sulphuros. Nebula, Argent. Nit. Swab, Chlori Gargar., Formalin Spray, Hydrogen Peroxide, Iodic Acid, Iodised Phenol (Pigment, Gargle and Inhalation), Loeffler's Pigment, Menthol Pigment, Naphthol cum Camphora, Ozonic Ether, Papain, Resorcin, Sodii Benzoatis Nebula, Sodii Chlorinat. Liquor, Toluol.

Spraying the throat with Hydrarg. Perchlor. 1 in 1,000 has saved life.

For sustaining blood pressure Adrenalin 2 to 3 minims hypod. every 6 to 8 hours.

Aspirin, Phenacetin and Dover's Powder. Combined Tablets are made.

Diphtheritic Infections of the Skin.—Zinc Ions.

Dipsomania.—*See* **Alcoholism.**

Disinfectants.—*See* Chapter on, Vol. II.

Disseminated Sclerosis—*See* **Sclerosis, Disseminated.**

Diuretics.—*See* **Dropsy, Renal.** *See also* Ammon. Acet., Cantharides, Digitalis, Novasurol, Pil. Hydrarg., Theobrom. Sod. Sal.

Dropsy, Cardiac.—Adonidin, Apocynum preps., Asparagin, Baillie's Pill, Digitalis, Elaterium, Erythrophlœum, Pituitary (Entire gland), Strophanthus, Theobromine Aceto-Salicyl, Theophylline. Pil. Hydrarg. (avoid if renal disease present). Sodium Chloride-free diet.

Dropsy, Hepatic.—Ammon. Benzoas, Ammon. Chlorid., Hydrarg. Subchlorid., Ol. Juniperi, Sodii Bicarb., Sparteinæ Sulphas.

Dropsy, Renal.—Ammon. Acet., Cit., Tart., Apocynum, Bismuth Carb., Buchu, Caffeina, Cantharides Tinct., Elaterium, Hydrarg. Pil., Iodo-Caffeine, Coramine, Ephedrine, Iodo-Theobromine, Jalapa, Pilocarpine, Pot. Acet., Pot. Tart. Acida, Pot. Iodid., Pot. Nit., Quinine, Salyrgan, Scilla, Scoparius, Sodii Iodid., Theobromine and Salicyl, Theophylline, Urea, Vinum Diureticum. Pot. Permang. Injection.—*See* Uræmia.

Dupuytren's Contraction.—Fibrolysin, Injectio Thiosinanamin et Antipyrin (*see also* Sir J. Barr, under Calcii Chlorid). Thyroid Gland and Three and Four Gland Tablets.

5% Salicylic Acid Ointment found effectual in several weeks.—D. A. Alexander, B.M.J. i./23,794.

Dysentery.—Determine cause.

Alum Inject., Antidysenteric Sera, Argenti Nitras (Rectal Injection), Belæ Fructus, Benzyl Benzoate, Bism. et Cerii Salicylas, Bisciniod, Bismuth Tart. Solubile, Calcii Salicylas, Cannabis, Cassia Beareana, Calomel, &c. (evacuant), Charkaolin Granules, Cynoglossum, Dec. Simaruba et Punic. Granat., Elix. Agrimon. Co., Emetine Bismuth Iodide, Emetine Injections, Emetine Periodide, Eucalypti Gum, Fæxin, Guarana, Hamamelis, Helba, Hyd. Perchlor., Hyd. Subchlor. (large doses), Hydrog. Perox., well diluted as enema, Ipecac. 'Stearettes' or 'Formagules,' Holarrhena, Krebisote, Ipecac. Co. Pulv., Mag. and Sod. Sulphates, Naphthalene, Opium, Plumbi Acetas, Pot. Permang., Salicylic Acid by Rectal Injection, Sedeff, Silica Gel., Simaruba, Tannin, Trilactine, Tylcalsin, Tyllithin, Terebenum purum, Terebinth Ol. and Stupes of, Yeast, Dysentery Vaccine.

Ether and Caffeine hypodermically when patient *in extremis.*

Excellent results with injections of 10 Cc. of a 10% solution of Calcium Chloride with Morphine, subcutaneously.—Jl. A.M.A. ii./25,1521.

Amœbic Dysentery and 'Carriers.'—Auremetine, Conessine, Emetine Injections and Emetine Periodide or Emetine Bismuth Iodide (*vide* Ipecacuanha chapter), Simaruba, Stovarsol.

Calomel for obstinate amœbic dysentery, in doses of 0·03 Gm. 12 times a day for 3 days, followed by 3 days' treatment with Bismuth Subnitrate (0·5 Gm. 12 times daily).—G. Beijnen, per Jl. Trop. Med., Aug. 1/23,256.

Lamblial dysentery well treated with Carbon Tetrachloride.—M. Khalil and I. Shawky, Jl. Trop. Med., Sept. 15/23,285.

Yatren *per os* and as irrigant following appendicostomy. Stovarsol well spoken of or a mixture of Tincture of Ferric Chloride 20 m., with Mercuric Chloride Solution ½ dr., in ½ oz. of water, further diluted when taken—thrice daily, continued for months and given with a nightly dose of Liquid Paraffin. —R. E. Drake-Brockman, L. i./26,905.

Bacillary Dysentery.——Emetine, Silver Gelatose (*i.e.* Albargin), *q.v.* Enema 1 to 1½ pints, strength 1 grain to 1 ounce. Formalin *diluted* as rectal injection (painful).

Rhubarb (*q.v.*) stated to be magical but no effect on bacilli in laboratory.

Readiiy responds to saline treatment and if given early Magnesium Sulphate, a drachm every two hours, will relieve.—An Indian physician, C. and D., Sept. 1921, p. 378.

High incidence of cases at Claybury found during winter months. Strict observation and permanent isolation needed.—W. S. Dawson and W. Moodie, L. ii./21,225.

Ripe apples mashed into a purée cured dysentery even with high fever. An old recipe revived.—Professor Moro, L. i./30,526,672.

Acid formation to kill intestinal dysentery (and typhoid) organisms. Orange and Lemon juice kill B. typhosus. With regard to the Apple Pulp treatment of dysentery, it seems probable that the pulp *in bulk* might not be neutralised in the system and hence be capable of acting where the inflammation is situated. —MacKenzie Douglas, L. ii./30,789. *See also* Typhoid.

Dysmenorrhœa.—Actæa, Æther Spt. cum Opii. Tinct., Amyl Nitris, Apiol, Belladonna Suppository, Benzyl Benzoate (?), Butyl Chloral Camphor, Cannabis, Cannabis and Chloral, Castor, Chloretone, Cibalgin, Elixir Ergotæ c. Ferro., Ephedropyrin, Gelsemium preps., Gossypii Rad. Cort., Liq. Cauloph, et Pulsatilla, Guaiacum Resin Cachets, Mist. Dysmenorrhœica, Mist. Morphin. Phenazon. Co., of W. W. W., Opium, Ovules Morphine, Mist. Senecio Co., and others, Piscidia, Potass. Bromid., Pulsa, Pulsatilla, Salix nigra, Saw Palmetto, Senecio, Serpentaria, Sodii Salicylas, Styptol, Stypticin, Syr. Iodo-Tannicus, Tab. Ergot Senecin Comp., Valerian, Viburnum.

Potassium Bromide 160 grains, Chloral Hydrate 80 grains, Nepenthe 80 minims, Elixir Viburnum Co. 2 ounces, Water to 8 ounces. ½ oz. *t.d.s.p.r.n.ex ag.*—found useful.

Gland Tablets.—Corp. Lut., Pituitary, Ovarian, Testic.

Thyroid, with other measures, brings relief in some cases. Atropine 1/200 grain thrice daily commencing 2 days before period of value when dilatation needed but refused.—B. Venn Dunn, B.M.J. i./31,971.

Dyspepsia.—Acid. Carbolic, Acid. Nit. Dil., Acid. Hydroch. Dil., Acidin, Alkagen Tabs., Aloin, Ammon. Carb., Ammon. Chloridum., Arsenic, Bisciniod, Bismuth Comps., 'Bismuth and Pancreatin,' Cajuput Ol., Calcii Peroxid., Capsicum, Caps. Valerian Co., Catha Milk and Glyceroph., Cerii Oxalas, Charbon Naphtole, Condurango, Creosote, Creosoti Valerianas, Diascordium, Elixir Gent. Acid, Fæxin, Gentiana, Gingerin, Hydrarg. cum Creta, Hydrastis, Hydrocyanic Acid, Hysterionica, Lecithin Elixir and Emulsion, Leptandra, Liquor Pepsinæ et Caffeinæ, Liq. and Tabellæ, Papain et Iridin, Lithia-Bism. Citras, Liq. Bism. Tart., Magnesia Cream, Magnesii Hydroxidum cum Carbone, Mist. Carminative, Nux Vomica, Ol. 'Elliott' caps., Ol. Valerianæ, Pancreatin, Papain Glycerin, Pepsin, Pepsin and Bismuth Tablets, Podophyllin, Quassin, Quinine, Rhei Rad. Pulv., Sal Polychrestum, Sedeff, Serpentary, Sodii Bicarb., Sodii Hyposulphis, Sodii Sulphocarb., Sodii Taurocholas, Sodium Bism. Citras, Sodium Citrate for adding to Milk, Spirit Meliss. Comp., Tab. Bismuth Pepsin et Cascara, Thyroid and Manganese, Tinct. Bellad., Tinct. Caryophylli, Tinct. Rhei Aquos, Trilactine, Troch. Antacidi., Pulv. Dyspeptic Co.

A few drops of Hydrochloric Acid to reinforce the action of the gastric juice, *e.g.*, 10 to 15 drops in ½ pint of sweetened water, as a drink during or after meals.

Benzonaphthol in small dose with Magnesium Carbonate and a little charcoal in the middle of each meal used in France.—B.M./F.W.XV.

Arteriosclerotic dyspepsia. Abernethy's rules—allow 6 hours between meals, chew well, rest after, dine off one dish.—T. C. Hunt, L. ii./30,1005.

For Fæces Examination, *see* Vol. II.

Dyspnœa.—Æther Spt., Æthyl Iodid., Alcohol, Ammon. Carb., Amyl Nitris, Erythrol Nitrate Tablets, Euphorbia Peplus, Lobelia and Lobeline, Morphine, Nitroglycerin, Oxygen and Alcohol, Oxygen injected, Ozonic Ether, Pl. Caffein Tri-Iodid. Co., Quebracho, Sodii Nitris, Strychnine.

Earache. *Locally.—Atropinæ Liquor or Oleatum (diluted), Chloroformi Vapour, Cocaina cum Oleo, Glyc. Acid Carbolic 6 grains to ounce, slightly warmed, 2 or 3 drops, Guttæ Spiritus c. Formalin, Liquid Paraffin (for soft wax in the meatus), Menthol-Paraffin Capsules, Morphinæ Oleatum (diluted), Opii Tinct. cum Oleo Oliverœ, Ung. Lanoboric Camphorat.* *See* **Aurinaria,** *also* **Nebulæ.**

Ecbolics.—Ergot preparations, Cayenne, Ginger, Helonias, The Hellebores, Lead, Myrrh, Oil of Pennyroyal, Savin, all drastic purgatives.

Eclampsia.—Amyl Nitrite Sterules, Chloral Hydras., Erythrol Nitrate Tabellæ, Morphine, Musk, Nitroglycerin, Papaverine, Parathyroid, Pilocarpine, Veratrum, Thyroid, Sodium Acetate Injections ½ drachm to the pint. Sod Bicarb. 250 Cc. 3% Solution intrav. repeated 3 hours later. *Routine Treatment.—Purgatives, e.g.*, Jalap, Mag. Sulph., Calomel and Croton Oil. *Diaphoretics.*—Pilocarpine (of great value). *Nerve Sedatives.*—Bromides, Chloral-Morphine in varied dose.

Calcium Chloride, Calcium Gluconate, Potassium Chloride, Serum Treatment, removal of colostrum, hot packs and hot air bath, Oxygen, the injection of air or Oxygen and Potassium Iodide into the mammæ, and lumbar anæsthesia have also been used. Venesection combined with the endeavour to eliminate the poison and dilution with Saline Transfusion. (Not advised by all.)

Strogonoff's method includes Morphine subcutaneously and Chloral per rectum in alternate doses and at stated intervals. The Dublin method includes Morphine (alone) in total doses of ½ to 1½ grains.—T. W. Eden, B.M.J. ii./22,675.

The pregnant woman absorbs more toxins than normal from the intestinal canal. These should be detoxicated and conjugated by the liver, Calcium being the most important chemical in the processes involved. Calcium intake is insufficient—further, the fœtus demands it.—G. W. Theobald, L. i./30,1119,

A Veratrine preparation at first sign of a fit and Morphine and Hyoscine used later.—R. Kelson Ford, B.M.J. ii./30,726.

Ecthyma.—Ol. Tereb. in Oil injection.

Eczema.—Arsenobenzol and Arsenicals, Ca. Lactate, Ca. Iodid., Harrogate Water, Iron Salts, Milk and Glyceroph., Ol. Morrhuæ, Phosphorus, Sod. Cit., Sod. Brom. intrav., Sod. Ricinoleas, Sod. Silicas intrav., Sulphides, Sulphur, Thyroid, Three Gland and Four Gland Tablets, Trilactine (Tabs. and Milk), Vaccine Staphylococcic.

Locally.—Acid. Boric., Acid Camphoric. Lotio and Ung., Acid Carbolic, Lotio and Ung., Acid Salicylic Ung. and Ol., Acid Picric Solution ½ to 1% and Ol., Alibour Water, Alkaline lotions, Anserine Mulls Medicated, Argent. Nitrat. Sol. (particularly for mucous surfaces of anus, vulva, etc.), Balsamum Lanolinatum. Bismuth Nit. Glycerin, Colloidal Silver, Mercury, etc., Calaminæ Lotio (et Oleosa), Calcii Chlorid., Ungt. 6%, Calcis Aqua, Calcis Linim., Chrysarobini Ung. (weak), Cremor Sicc. preps., Creolin, Cupri Sulph., Diachyli Ung., Ether-Soluble Tar Paste, Formalin, Moist (for dry condition), Formosyl, Formosyl Huile de Cade, Hydrogen Perox., Ichthyol and Collodion and paste of, Iodates, Kaolin Ung., Lanolin Lotio Nigra, Lotio Plumbi Lactat., Formosyl dusting powder, Methylene Blue, Naphthol, Paraffin No. 7, Pellanthum preps., Perfumed Formosyls, Pigment Olei Eucalypt. et Ac. Salicyl., Sodii Carb., Sulphur Colloidal, Ung. Hyd., Perox., Ung. Thorii Oleatis, Ung. Rumicis, Ung. Rusci Co., Vleminckx's Solution, 'X' rays and Light Therapy, Zinci Boras, Zinci Cremor, Zinc Ions, Zinci Oleat. Pulv. and Ung., Zinci Ung.

Ointment of Liquor Carbonis Detergens 1, Ung. Hyd. Nit. 3, Ung. Simplicis 4. Also Liq. Carbonis Det. in Lotion c. Liq. Plumbi *a.a.* 3 to 4%.

Seborrhœic eczema may be due to a relative acidosis. Alkalis, *e.g.*, Sod. Bicarb. 1 drachm, Pot. Citrate 30 grains, Calc. Lact. 5 grains, Mag. Carb. 5 grains, Chloroform Water to 1 ounce.—H. M. Barber and H. C. Semon, B.M.J. ii./18,245.

Eczema of Infants, obstinate.—Thyroid Gland has been suggested.

Infantile eczema well treated by Purified Coal Tar and Zinc Oxide of each 2 parts, Corn Starch and Vaseline of each 16 parts.—H. MacCormac, L. ii./23,242.

In obstinate cases a Tar Paint: Crude Coal Tar 1 ounce, Collodion 1 ounce, Acetone 1 ounce. Applied with brush, repeated every two or three days.—H. G. Adamson, L. i/25,350.

Lotio Hyd. Flav. applied with gauze swab 4 or 5 times daily effective for eczema of infants and adults on face, hands, arms, or scrotum. Discontinue after 8 or 10 days and apply Ammoniated Mercury Ointment.—Per Pres., Oct., '29,342.

Anal and vulvar eczema. Paraffin preparations *per os* should be forbidden: leakage may cause re-infection. Prevent rubbing of clothes. X-Rays, High Frequency and Low Tension Diathermy, Zinc Ionisation, Ultra-Violet Light. Menthol Ointment, 4 grains to the ounce, relieves irritation: Cocaine 2% also useful: also Hyd. Ox. Flav., 1 grain, to 1 ounce of Paraff. Moll., Calomel 20 grains, Zinc Oxide 1 dr., Paraff. Moll. 1 ounce.—A. Savill, L. i./29, 680,731.

Acute facial eczema yields very readily to the following cream: Stearic Acid 15 Gm., Borax 0·4 Gm., Ammonia (0·92) 6 Gm., Water 78·6 Gm.—Per Pr., Dec., '29,444.

Obstinate cases cured by daily bath of 2 lbs. Sodium Bicarbonate to 20 gallons water, with change of linen and an ounce of Magnesium Hydrate twice daily. A case of 18 years standing cleared up in 3 days.—S. A. Leader, B.M.J. ii./31,323.

Electric Current Injuries.—*See* **Radiology** Vol. II.

Elephantiasis.—Arsamin, Pituitary Extract.

Non-filarial elephantiasis.—J. E. Schofield, B.M.J. i./31,795.

An early case cured by protein shock. Four injections of T.A.B. vaccine.—W. E. Cooke, L. i./28,390. Non-specific protein (Vaccine 800 million) also T.A.B. intravenously had good effect.—G. Carmichael Low, B.M.J. ii./30, 1065; L. i./30,72. T.A.B. Vaccine, from 25 to 800 millions, with a pressure bandage: successful.—L. McGolrick, B.M.J. ii./30,957.

Emetics.—Apomorphine $\frac{1}{10}$ grain inject. hypod., Antim. Tart. 1 to 2 grains, and Vinum 2 to 4 drachms, Ipecac. 30 grains, and Vinum 4 to 6 drachms, Mustard a tablespoonful, Sodii Chloridum a tablespoonful, Zinci Sulphas 20 to 30 grains. *See also* **Poisons and Antidotes.**

Emphysema.—Iodides and Iodine preparations, *e.g.*, Caffeine Tri-Iodide. If patient too stout add Thyroid to the Iodine. If excess of lime in the blood Sodium or Potassium Citrate or Limonade Purgative. Coramine. Keep bowels open with Sodii Sulph.

Empyema.—Hydrogen Peroxide for washing the pleura (10%). Douching with Dakin's Solution. Streptococcal, and Pneumo. Vaccine.

Injection of 2% Formalin in Glycerin (Murphy's).—H. Wade, B.M.J. ii./21,150.

Closed drainage in empyema. Irrigation with Dakin's Solution.—J. D. McEachern, B.M.J. i./31,389. See also W. Mitchell, *ibid.* 516.

Empyema thoracis. Aspiration and Oxygen replacement of the effusion. Repeated puncture of the chest wall may be needed, using 1% Novocain.—H. Morriston Davies, B.M.J. i./31,569.

Encephalitis, Epidemic (previously called Encephalitis Lethargica. *See also Vol. II.*). Keep patient at rest and free from worry; give Ammonium Bromide or Chloralamide if necessary.—Wilfred Harris, B.M.J. i./21,47.

Aetiology. Outbreaks have followed epidemics of influenza also of poliomyelitis.

Pathology. A small coccoid organism has been isolated, filtrable, present in the secretion of the naso-pharynx. The cerebro-spinal fluid shows only a moderate degree of lymphocytosis. Urea and sugar are definitely increased. Acetone is present in small amount.

Symptoms. Stupor is the most characteristic feature, lasting for a varying period. There is a focal disturbance of the nervous system, *e.g.* paresis of the ocular muscles.—Pres., Aug./20, p. 290; Feb./21,65. See also A. Howell, Pr., April, 1920.

B.M.A. Discussion on, opened by Ivy McKenzie, B.M.J. ii./27,532. Pathology, by J. Godwin Greenfield, *ibid.* 535. Chronic encephalitis, G. Riddoch, *ibid.* 537. Mental aspects, by R. MacNab Marshall, *ibid.* 539.

Allied to polio-encephalitis, but not identical.—B.M.J. ii./21,205.

The Ministry of Health issued a pamphlet (1924) on, revising that of 1921.

The residual symptoms or sequelæ are resistant to every therapeutic measure.—C. M. H. Howell, B.M.J. i./25,437.

There is derangement of carbohydrate metabolism with hyperglycemia suggesting a toxæmia acute in onset but becoming chronic. Hyoscine of undoubted value though temporary. Start with 1/150 grain once a day hypodermically increased if necessary to 1/50 grain. *Per os* larger doses may be employed thrice daily, preferably after meals.—P. K. McCowan and co-workers, B.M.J. i./26,779; L. i./26,802.

In many cases transient or permanent relief with diminution of stupor follows withdrawal of cerebro-spinal fluid. Hypnotics not advised. Hexamine, if given, should be in small doses with caution. Belladonna has been advised by Hall in chronic forms.—A. Salusbury, B.M.J. i./26,1073.

Chronic cases treated intraspinally with Casein, ½ Cc. of 10% solution added to 10 Cc. Normal Saline, starting with small dose, *e.g.* ½ mgr.—B.M.J.E. ii./24,63.

Hexamine, 10 to 12 Gm. per diem, intravenously or intramuscularly, with oral use to limit of tolerance. Intraspinal injections of 1 to 2 Gm. per day also given. Sodium Iodide, 50% solution intravenously in doses slowly increasing from 6 to 20 Cc. per day, used by some. Sodium Salicylate, 1 to 6 or even 8 Gm. per diem intravenously, in 4% solution, said to be brilliant.—B.M.J.E. ii./26,26.

Convalescent serum intraspinally spoken favourably of in acute cases, but of no use in Parkinsonian syndrome.—Per L. i./27,193.

Treatment by induced malaria.—P. K. McCowan and L. C. Cook, L. ii./27, 861.

Appreciable improvement after treatment by ultra-violet rays. The entire body was exposed to radiation twice weekly for 6 to 7 weeks, the maximum exposure being 10 minutes to both back and front at a distance of 16 inches from a Mercury-Vapour lamp, or preferably 3 lamps used simultaneously.—H. N. Jaffe, B.M.J. ii./27,1219.

Acriflavine Inj. Intrav. has been advised.

Bulbocapnine for sequelæ.

For sequelæ—Stramonium has been advised.

Difficulty of Diagnosis.—Of 16 cases 11 were other conditions, including tuberculous meningitis, brain abscess and brain tumour.—J. C. Earl, L. i./25,873.

Difficulties with children. Most liable to be confused are gastro-enteritis, tuberculous meningitis and pneumonia.—J. L. Halliday, L. i./25,763.

The relation of paralysis agitans to the Parkinsonian syndrome of encephalitis.—René Cruchet, L. ii./25,263. *cf. Parkinsonism.*

Encephalitis Post-vaccinal, see p. 945.

Endocarditis.—Aconite, Arsenic, Belladonna, Caffeina, Collargol, Coronillæ Ext., Digitalis, Fæxin, Ferric Chloride, Nuclein and Anti-Streptococcic Serum and Vaccine, Pituitary Extract, Pneumo. Vaccine, Sod. Cacodyl., Veratrum.

Locally.—Belladonna Plaster, Blisters, Ice Bag.

Endocarditis Bacteriology, diagnosis and treatment. Positive blood cultures in the chronic cases by no means invariable. Almost entirely streptococci.—Sir Thos. Horder, L. i./26,695,745,850.

Endocarditis, Rheumatic.—Gentian Violet intrav., Tylcalsin intrav.

Endometritis.—*Locally.—Injectio Formalin, Copper Sulphate (and Ionised) also Zinc Ions. Local use of Churchill's Iodine Tinct. Pond's Tampons.*

Swabbing and irrigation with a Solution of Iodine (1 in 10) 1 part and Glycerin 7 parts.—R. Hobbs, B.M.J. ii./21,35. B. Coli Vaccine.

Enteritis.—*See* **Gastroitis and enteritis.**

Enuresis.—Arsenic, Atropine, Belladonna (*q.v.*), Bromides, Buchu, Calc. Phosph., Camph. Monobrom, Ephedrine, Ergot, Ferri Iodid., Ferri Perchlor., Hyoscine, Hyd. Subchlor., Hyoscyamus with Sodium Bromide, Hexamine, Liq. Strych., Lycopodii Tinct., Nux Vomica, Phenazone, Pot. Citras, Rhus Aromat., Rhus Tox., Thyroid Extract (Standardised Preps.).

Belladonna, Hyoscyamus and Bromide may help for a time, or even cure.—S. A. Tucker, L. ii./30,706.

Nocturnal incontinence in children. Ext. Ergot. Liq. 5 minims to a child of 5 years, with 2½ minims Ext. Glyc. Liq. and a drop of Peppermint effectual in a fortnight. Worth trying.—A. Patton, B.M.J. ii./30,981.

Mustard and pepper taken by boys found responsible for nocturnal incontinence.—T. W. Rothwell, B.M.J. i./31,42.

All drugs found useless. Train the child to empty bladder during the day at increasing fixed intervals.—J Pereira Gray, B.M.J. ii./30,906.

Epidermomycosis (Athlete's foot). Castellani's Paint, Ung. Ac. Salicyl., Mycozol.

Epididymitis—Aconite, Antimonial Wine, Calcii Chlor. intrav., Iodides, Saline Purgatives, Gono. Vaccine.

Locally.—Atropine Suppos. (1/75 *gr.*) *and hypod., Colloidal Mercury and Silver, Ice, Iodine, Guaiacol, Iodum Oleat., Lin. Potassii Iodid., Ung. Iodi Intinctum. Heat, with moisture, Mercury, and Belladonna Ointments.*

Epilepsy.—Adonis, Æthyleni Bromid., Ammon. Bromid., Amyleni Hydras., Amyl Nitris, Antifebrin, Argent. Cyanid or Nit., Arsenic, Arsen. Brom., Atropine, Auri Bromid. and Chlorid., Belladonna, Bismuth Sod. Pot. Tart. Injn., Borax, Bromalbumen, Bromal Hydras, Brominol, Calcium Bromide, Calcium Lactate, Camph. Monobrom., Cannabis, Chloral, Elix. Calcii Chlorid., Hexamine, Hyd. Biniodid., Liq. Auri et Arsenii Bromid. and Liq. Auri et Hyd. Brom., Luminal Sodium, Magnes. Bromide, Manganese Bromide, Mist. Brominol c. Nux Vom., Nitroglycerin Tabellæ, Ozonic Ether, Peptone Therapy, Picrotoxin, Pot. Boro-Tart, Pot. Brom., Pot. Nitris, Santonin, Snake Venom, Sod. Brom., Sodii Nitris, Thyroid, Valerianates, Viscum album, Zinc Salts.

Parathyroid. Prevent constipation.—Cascara, Calomel, etc.

Pot. Brom. 1 ounce, Pot. Bicarb. ½ ounce, Liq. Arsenicalis 1½ drachms, Liq. Arsen. et Hyd. Iodide 3 drachms, water to 8 ounces. Signa : Two drachms in water after meals three times a day. 'Marvellous in effects.'—P.J. i./15,150.

Hexamine and in conjunction with Ammon. Brom. and Sod. Cit.—McC. Morris, see p. 451. Hexamine it is thought helps to destroy the cause of the fits—*i.e.* B. Coli.

Blood sugar usually low. Glucose 50-100 Gm., or sugary foods, combined with Luminal and Bromides, recommended.—Pres., Jan., '27,18.

Cholesterol of the blood plasma in epilepsy is subnormal, especially at time of fits.—M. Gosden, J. Tylor Fox and W. Russell Brain, L. ii./29,12.

Episcleritis.—A seasonal disease of the eye occurring particularly in certain humid districts—to be differentiated from tuberculous episcleritis. The disease is chiefly superficial, involving the episcleral tissues. Antirheumatic remedies are given for two or three weeks or more. Given soon after the onset Colchicum shortens its course, *e.g.* Tincture B.P. (of seeds) in 15 m. doses thrice daily with Sod. or Mag. Sulph.—P. A. Harry, Pres., May '20,198.

Epistaxis.—Acid. Gallic., Aconite, Acetanilide, Calcium Chloride and Elixir Ferro-Alumen, Ferri Perchlorid. Hamamelis, Terebinth. Oleum.

Locally.—Acid Tannic., Adrenalin, Alumen, Amyl Nitris (*inhaled*), *Ferri et Quininæ Chloridum, Ice, Hamamelis, Hydrogen Peroxide.*

The best position during an attack of epistaxis is reclining in an easy chair with the hands clasped behind the head, and the collar loosened. No styptic—*plain dry wool is all that is necessary.* Cold may be applied to the nape of the neck or to the bridge of the nose with the idea of causing reflex contraction of the bleeding vessels ; if it is not quickly successful it should not be persisted in. Hot water (at 115° F.) injected may prove successful. If this fails, introduce a strip of ribbon gauze, about 18 inches long, soaked in equal parts of Adrenalin Chloride (1 in 1,000) and Cocaine Hydrochloride (20%), so as to bring it in contact, as far as possible, with all parts of the nasal mucosa ; after 5 or 6 minutes the plug should be withdrawn and an attempt made to discover the bleeding spot by means of a head-light and speculum ; should the bleeding spot be discovered it may be possible to control it by direct pressure or by application of the galvanocautery, or if the bleeding persists the nose should be packed with strips of ribbon gauze.—E. W. Roughton, Pr., Oct., 1910.

Epithelioma.—Radium, *see also* **Cancer.**

Erysipelas.—Acetanilide, Aconite, Aconitina and Granules of, Antifebrin, Antistreptococcic Serum, Belladonna, Digitalis, Ergot, Fæxin, Fæxin Extract, Ferri Perchlor., Mang. Butyrate, Milk Injections, Nuclein, Veratrum viride, Streptococcal Vaccine, Buttermilk internally and locally.

Locally.—Acid. Picric Pigment, Acid. Sulphuros. Lotio, Argent. Nit., Belladonnæ Glycerin., Calaminæ Lotio, Creosote, Gossyp. Acid. Boric., Ichthosulphol, Iodine, Iodii Tinct. injected (*q.v.*), *Iodum Oleatum, Ung. Iodi Intinctum, Liq. Alum. Acet., Liq. Fe. Perchlor., Mag. Sulph. Solution, hot fomentation, Oleoge Comps., Ol. Tereb. in Oil Iniectio, Pasta Plumbi cum Cupro.*

Liq. Ferri Perchlor. 20 or 25 m. thrice daily acts almost as a specific. Collodion locally helps.—B.M.J. i./20,352.

Stock vaccines subcutaneously of S. erysipelatis or S. pyogenes, polyvalent streptococci, and a combined staphylococcus and streptococcus. Also a 'Hospital' vaccine. Results most unsatisfactory. A cold saturated aqueous solution of Magnesium Sulphate, containing 10 to 20% Glycerin, favoured.—W. T. Benson, L. ii./30,1286.

X-Rays good.—R. H. Jamieson and F. Hernaman-Johnson, B.M.J. i./31,57.
Excellent results with dressing containing Alcohol 96% 50 parts, Sublimate solution (1 in 1,000) 1 part: or, if Sublimate solution not tolerated, 1 to 1·5% Copper Sulphate solution.—S. Kruger, per M.A. '31,180.

Erythema.—Febrifuge Salines, Aconite, Anthemis, Calcii Lactas, Salicin, Salicylates, Salol, Trilactine, Sulphur Stearettes.

Locally.—Diachyli Ung., Hazel Foam preps., Kaolin and Lotio, or Ung., Papav. Infus., Perfumed Formosyls, Plumbi Subacet. Lotio., Vaseline, Zinci Oxid. and Ung., Ung. Thorii Oleat, High Frequency Current, Pellanthum preps.

Erythema nodosum—an acute specific fever.—J. O. Symes, B.M.J. ii./21, 741. Uninfluenced by Sodium Salicylate but cured by Calcium Chloride with local sedatives and rest.—H. Hallam, B.M.J. ii./21,917.

Erythrœdema.—Attention to diet and painting the gum with 1% Chromic Acid to prevent secondary infection, the main points. Large doses of Atropine or Calcium Lactate suggested.—J. S. Fowler, B.M.J. i./25,1078.

Erythrœdema polyneuritis (Pink Disease).—Vitamin B, Marmite in large doses, Calcium.—L. i./29,926.

Erythræmia.—Phenylhydrazine.

Espundia.—Antim. Pot. Tart.

Exhaustion.—Nervous and Muscular.—Oxygen Inhalation (and with Alcohol), Amyl Nitrite, Stimulants, Catha Milk and Glycerophos., Coca preps., Coca Wine. *Cf.* other headings, *e.g.*, **Anæmia, Collapse and Fainting, Debility, Food, Hæmorrhage, Nervous debility, etc.**

Exophthalmic Goitre (Graves' Disease).—Arsenic, Calcium Salts, Digitalis, Ergotamine Tart., Fucus, Iodine, *e.g.*, as Lugol's Solution, Iron Salts, Pituitary Dried (Posterior lobe), Quin. Hydrobrom. Sulph., Suprarenal, Sodii Phosph., Thymus Gland, Thyroidectin.

Locally.—Acid Sulphuros, Tinct. Iodi Oleosa., Ung. Iodi Intinctum, and Iohydrin, X rays.

'X' ray treatment is best.—G. R. Murray, B.M.J. ii./13,163; L. ii./13,200.
Arsenic, Bromides, Belladonna, and Quinine Hydrobromide.—G. R. Murray, B.M.J. i./22,906.
Treatment of exophthalmic goitre.—F. R. Fraser, B.M.J. i./26,555.
Great importance is attached to the anæsthetic used in thyroid surgery, and either local anæsthesia (Novocain 0·25%), or open Ether or Ether by the intratracheal route, is advised.—T. P. Dunhill, B.M.J. ii./27,1089.
Keep patient one week in bed under observation before commencing treatment. Give light diet with no stimulants and large quantities of fluid, with one pint of rectal saline daily, and 3 minims of Lugol's solution thrice daily. Excellent results, but if discontinued symptoms tend to return.—A. J. Walton, B.M.J. i./28,83.
A diet rich in carbohydrates advocated.—H. Moll, B.M.J. ii./28,52.
Iodine causes only temporary amelioration. X-ray therapy gives material improvement in only 52% of cases, and if improvement is not obvious in 6 months the case should be operated upon. Operation gives 80% cured or improved.—C. S. D. Don, B.M.J. i./29,1112.
Drug treatment mainly symptomatic—Quinine, Ovarian products, and Suprarenal cortex. Thyroid, Opiates, Iodides, and Digitalis, were *avoided.* Rest and change essential.—I. Bram, L. ii./29,994.
Young patients with primary Graves' disease, recovery can be effected without surgical treatment.—F. R. Fraser, B.M.J. ii./30,811.
Vaccines should *not* be given in exophthalmic goitre or gout.—Sir W. Willcox, B.M.J. ii./30,736.
(Iodoform has tendency to produce symptoms of exophthalmic goitre in susceptible persons.)

See also Goitre (simple).

Eye: Optic Atrophy. Retinal extract has been very unexpectedly successful.

Eye: Pupil, Contractors of.—*Arecoline in 1% solution, Jaborandi and Pilocarpine, Opium and Morphine, Physostgima, Physostigmine.*

Eye: Pupil, Dilators of.—*Atropine Salts, Cocaine, Daturine, Duboisine, Ephedrine, Homatropine and Hyoscine salts, Hyoscyamine, Nicotine, Oleum Homatropinæ.*

Organic Extracts, *e.g.*, suprarenal and pituitary, have marked effect as pupil *dilators,*—thymus, ovary, muscle and kidney less.

Eye: Local Dilator, but Contracts when given internally in suitable doses—Gelseminine.

Ocular pain. Acriflavine, 1 in 4,000 for irrigation (but is not germicidal), before operation and after. Heat, and hot sponging and fomentations good. Dionine unreliable—very severe conjunctivitis had followed. Massive doses of Salicylates, Milk injections.—Freeland Fergus, and discussion, B.M.J ii./25,506.

Fainting.—*See* **Collapse.**

Fat, to reduce, *see* **Obesity.**

Favus.—*See* **Parasites, Vegetable, on skin.**

Fetid Breath.—*See* **Breath, Fetid. Perspiration.**—*See* **Perspiration, Fetid; Nasal Discharges.**—*See* **Ozæna.**

Fever.—Acetanilide, Acid. Salicylic, Aconite, Amidopyrin, Ammon. Acet. Liq. and Carb., Alasil, Ammon. Cit., Antimony, Aspirin, Benzyl Benzoate, Biscinlod, Cinchonine, Cinchonidinæ Sulph., Cryogenin, Digitalis, Gelsemium, Granules d'Aconitine, Mist. Arsen. Quin. et Ferri, Magisal, Phenacetin, Phenazone, Pulv. Quininæ Comp., Pot. Borotart., Pot. Acet. Chloras and Citras, Pilula Antimon. Conii et Quinin., Quinine preps., Quinetum, Salicin, Salipyrin, Sod. Salicyl., Tylcalsin, Tyllithin, Veratrum Viride, Warburg's Tincture, Helba, Quinine Acetyl-Salicylate.

Aspirin, Phenacetin and Dover's Powder combined. Tablets are made.

Fibrosis, Chronic Subcutaneous.—Fucus, Thyroid, Diabetic Diet, Massage.

Fibrositis, Acute.—Amidopyrin with Aspirin. *Locally.—Chloral et Menthol, Methyl Aspriodine, Pigment Camphoræ. See also* Rheumatism.

Dover Powder at night gives rest: Aspirin 15 grains 6-hourly relieves pain and is often specific. For chronic fibrositis Lugol's Solution 5 minims twice daily. Thyroid promotes better metabolism.—E. B. Clayton and J. L. Livingston, L. i./30,1420.

Filariasis.—Organic Arsenic Compounds. Pepper and Capsicum, *e.g.*, Tinct. Capsici, thought to be prophylactic. Antimony Sod. Tart., also Antim. Pot. Tart. suggested but corroboration needed.

Mechanism of filarial periodicity.—P. Manson-Bahr, L. ii./29,47.

Fissures of Nipples. *Locally.—Acid Boric, Acid. Tannic Glycerin., Alcohol, Argent. Nit. pigment, Cocainæ Hydroch. Liquor, Collodium Flexile, Hydrastis Tinct., Styptic. Colloid., Tinct. Benzoin Co.*

Fistula in ano (Tuberculous). *Locally.—Cupri Sulph. Injn., Hydrogen Perox., Inj. Bismuth Subnit., Iodine Suppos., Iodoform Oil after operation, Pot. Permang. (packing with), Zinc ions.*

Flatulence.—Acid. Carbolic, Acid. Sulphuros., Æther Spt., Asafetida, Anise, Anethol, Aq. Carminativa, Betol, Biscinlod, Bismuth preps., Cajuput Ol., Capsicum, Carbo Ligni, Caraway, Cardamoms, Chloromorphiæ Liq., Cinnamon, Cloves and Tinct., Coriander, Creosote, Fennel, Magnesia preps., Menth. Pip. Ol., Myristica, Naphthalene, Naphthol, Nux Vomica, Pepsin preps., Sod. Bic., Sodii Sulphis, Sulphocarbolates, Tinct. Carminativa, Trilactine Zingib. Tinct.

Treatment of.—T. L. Hardy, L. ii./25,345,394.

Flies to Ward Off. *See* **Bites and Stings.**

Folliculitis, Pustular.—Bismuth Oxychlor. Ung.

Food Products.—*See* **Chapter on Nutrimenta,** (also Infant Feeding), Casein Preparations. For invalids are: Benger's Food, Catha Milk and Glyceroph., Conf. Glyceroph. Co., Enema Nutriens, Ferrocarnis, Herogen, Peptonoids of Beef, Milk and Glycerophosph., Nutrient Suppositories, Peptonised Milk, Peptonised Beef Jelly, Trilactine.

For Diabetic Foods, see Nutriments, Vol. I. For Bread Standardisation, Flour Bleaching, and Caloric Values of Foods, see Nutrimenta, Vol. II.

Artificial Feeding.—Dextrose (Glucose) Enema, Glucose Injection.

Fractures, for applying extension in.—Sinclair's Glue, Heusner's Glue.

Framboesia.—Organic Arsenic Comps.

Efficacy of Sulfarsenol and Silver Salvarsan is about equal. Three injections are necessary to cure the lesions. Sulfarsenol is equally efficacious either intrav. or subcut., but intram. is too painful. Silver Salvarsan intravenously does not produce any bigger fall of systolic pressure than Sulfarsenol—there is no fall of blood pressure after subcutaneous injections of the latter.—R. Knowles, Jl. Trop. Med., Dec. 1/23,360. *See also* Yaws.

Folliculitis, Pustular.—Bismuth Oxychlor.

Frost Bite.—*Friction with snow or cold water in a cold room best.* Friction with Turpentine and Oil or with Spirit and Soap Liniment useful in early stages and after that the limbs should be raised on pillows and wrapped in cotton wool. If blisters form or discoloration rub with Turpentine or with Spirit containing 1 in 500 Biniodide—or with Iodine.—A. W. Mayo-Robson. Keep the parts *cold* with foot raised slightly—smeared with some ointment, *e.g.* Carron Oil, with 2% Cocaine useful. Wrapping up *causes* pain.—B. Moynihan. Where there is moist gangrene, and especially where toxic absorption has taken place—amputation.—R. H. Jocelyn Swan. Counter irritants relieve pain for a time, but do not materially affect speed of recovery.—C. Max Page. Boric Zinc and Starch Powder.—F. McG. Loughnane.

Frost Bite: local baths of 5% Calcium Chloride.—B.M.J.E. ii./25,80.

Furunculosis, *vide* **Boils.**

Furunculosis Orientalis.—Inj. Antim. Ox., and Antim. Pot. Tart. For Nile boils—Strepto. vaccine.

Gall Stones and **Hepatic Colic.**—Æther Spt., Amyl Nitris, Amyl Valerianate, Apium, Petroselinum Inf., Caps. Sodii Oleat. Comp., Chloral Hydras, Hexamine, Mag. Sulph., Mercurials, Morphine preps., Nitroglycerin, Perles of Ether and Turpentine, Pil. Sodii Oleat, Podophyllin, Salicylates, Sodium Benzoate, Sodium Glycocholate, Various Mineral Waters, *q.v.*

During an attack of indigestion, pain and tenderness over the gall bladder, the patient should remain in bed on light (not too milky) diet. Give a mixture of Hexamine, Sodium Salicylate, Sodium Benzoate, Sodium Bicarbonate, Spirit of Chloroform and Infusion of Cloves.—Sir H. Rolleston, L. i./23,40. See also L. i./25,1207.

In cholecystitis, hepatic calculus, ulcerative colitis, and in some cases of ankylostomiasis, good results are obtained by duodenal lavage, *e.g.*, Argyrol and Protargol 0·75 to 1·5%, Silver Nitrate 1 in 20,000, Magnesium Sulphate and Jutte's solution, the latter consisting of Sodium Chloride 0·9% and Sodium Sulphate 0·9%, using 1 to 1½ litres for a lavage.—L. i./25,1309.

Cholecystitis.—Sodium Glycocholate 3 grains with Urotropine 7 grains in cachets, one night and morning.—W. Bain, L. i./29,495.

Blood Cholesterol estimation in cholelithiasis. 1 Cc. of blood or plasma is mixed with 5 Gm. Plaster of Paris and dried and extracted with Chloroform 20 Cc. Acetic Anhydride and Sulphuric Acid is added, and the colour compared with that produced using pure Cholesterol. The average content is raised in cholelithiasis. Whole blood Cholesterol is markedly raised in severe obstructive jaundice.—R. H. O. B. Robinson, L. ii./29,540.

Gall-Bladder Visualisation.—Iodo-ray (Tetraiodophenolphthalein), Sod. and Stront. Bromide.

Gangrene.—Nitroglycerin, Amyl Nitris, Quinine Hydrochloride, Sodium Nitrite.

Locally.—Acid Carbolic, Acid Nitric, Creosote, Flavine, Hydrogen Perox., Iodine Injection (vagina), Saline Injection (vulva).

Periarterial injection of Alcohol in gangrene of the extremities. 2 to 3 m. at four points round circumference of artery and into outer coat.—S. Handley, B.M.J. ii./26,1121.

Gangrene of toe cured by placing foot as often and as long as possible in warm water, gradually raised to a point just bearable, containing 5% Sodium Bicarbonate. Toe smeared at night with warm Glycerin and Belladonna and enveloped in cotton wool.—J. P. Gray, L. ii./26,1347.

Gangrene arising from Arteritis.—Acetylcholine.

Gas Poisoning. *See* GAS under **Antidotes** to **Poisons.**

Gastralgia.—Acid. Hydrocyanic. Dil., Æther Spt., Alkalis, Belladonna, Bisedia, Bisciniod, Bismuthi Oxy-Bromid., Bismuth Oleas, Bismuthi Salicylas, Bismuth Tart. Solub., Bromides, Calcis Aqua, Cannabis, Catha Milk and Glyceroph., Cerii Oxalas, Chloroform, Chloromorphiæ Liq., and Cocaina, Codeina, Creosote, Ginger, Magnesia, Cremor Magnesiæ, Mang. Oxid., Pepsin, Sedeff, Iodates, Chloretone, Cyanides, Menthol, Nitroglycerin, Trilactine.

Locally.—Linim. Sinapis, Ung. Ipecac. et Crotonis.

Gastric Secretion, to diminish.—Atropine small dose in large vol. of water on empty stomach.

To increase secretion wash the stomach with a weak pilocarpine solution, or employ Sodi. Bic. Magnesium Oxide and Bismuth Oxycarb. less stimulating. Small doses of Hydrochloric Acid in achlorhydria only have psychic effect.—T. Izod Bennett, B.M.J. i./23,366.

Gastritis and Enteritis.—Acid Hydrocyanic, Acid Lactic, Alasil, Alkalis, Ammon. Chlor., Aperfine, Bismuth preps., Bisciniod, Caffeine, Calcii Permang. and Salicylas, Carminatives and Sedatives, Collargol, Glucose feeding, Hexamine, Hydrastis, Hydrog. Perox., Ispaghula, Kaolin, Mist. Catarrhalis, Pot. Cit., Saline Transfusion, Salines, Salol, Sanguinaria, Sodii Sulphis, Strontium Salts, Tar Perles, Trilactine Tablets, Milk, etc. *Vide also* **Catarrh, Gastric.**

Chronic Gastritis.— Wash stomach each morning before breakfast with Hydrogen Peroxide 1 dr. to the pint until no more mucus comes away. Give small amount of HCl. for achlorhydria.—A. F. Hurst, L. ii./29,1027.

Gastric Ulcer.—*See* **Ulcers, Gastric.**

Hæmatemesis of.—Adrenalin, Beef Peptones.

Giddiness.—*See* **Vertigo.**

Gingivitis, *see* **Gums, Inflamed,** also **Vincent's Angina.**

Glanders.—Mallein. Mercurial Inunctions, Salvarsan.

Glands, Enlarged.—Calcii Chlorid., Ferri Iodid. and Iron Salts, Ferri Cacodylas, Iodoprotein Tabs., Iodum, Morrhuæ Ol., Potass. Iodid., Sodii Iodid., Syrupus Iodo-Tannicus.

Locally.—Cadmii Iodid. Ung., Hydrarg. Oleat. and Emplast., Iodi Decolor. Tinct., Iodoform, Iod. Ung., Iodi. Intinct., Ung. Iodermiol, Pot. Iodid. Ung.

Glandular fever.—An acute infectious disease, principally of children; rapid enlargement of the cervical glands; less constant enlargement of liver, spleen, axillary, inguinal and other glands. Outbreaks.—H. Letheby Tidy, and E. B. Morley, B.M.J. i./21,452. *See also* G. Evans and W. A. Robb, B.M.J. i./30,1039.

Glaucoma.—*Physostigminæ Sulph., Pilocarpina Nit.* (2%), *Alkaloidal Oil of Physostigmine* (1%), *Arecoline, Adrenalin* (0·01%), *Dionine* 5 *or* 10% *or pdr.*—B.M.J.E. ii./25,10. Glaucosan.

Iridectomy constitutes a drain for a limited time.

Good results from combined administration of 1·5 to 2·0 mgr. Adrenalin (according to age and weight of patient), a cachet of 0·1 to 0·2 Gm. Ergotin, and 1 to 2 Gm. Calcium Chloride in aqueous solution.—L. i./27,1380.

Congestive glaucoma. Combined use of Morphine ¼ grain and Nitroglycerin (an alkaline mixture containing Bicarbonate and Citrate of Potash and Soda with 1 minim of Liq. Trinitrini, for a dose every 3 hours), cuts short an attack. —J. Burdon-Cooper, B.M.J. ii./25,510.

Glossitis.—Hydrarg. Perchlor. in Lotion (2 gr. to 8 ounces).

Glycosuria.—*See* **Diabetes.**

Goitre.—Goitre is prevalent in magnesian-limestone districts, *e.g.*, Derbyshire—hence 'Derbyshire Neck.' Ammon. Fluorid., Arsenic, Barii Chloridum, Belladonna, Bromides, B. Coli Vaccine, Hyd. Biniodid., Hydrastis, Iodum, Naphthol, Phosphorus, Pituitary Gland Dry (entire gland), also Posterior lobe alone, Pot. Iodid., Quinine Periodide, Sodii Iodid., Syr. Ferri Iodid., Thymol, Thyroid feeding and preps., Thyroid and Manganese, Trilactine.

Locally.—Acid. Acetic. inj., hypod., Hydrarg. Biniodid, Ung. Hydrarg. Oleat., Hydrarg. Ung., Iodi inj. hypod., T.H., Ung. Hyd. Iodid. (diluted), Iodi Linim. and Ung. Zinc Salts, Cocaine, Ionisation, 'X' rays.

Small doses of Potassium Iodide (*q.v.*) or Sodium Iodide efficacious in districts where it is endemic but this is unsuited for those who already show signs of hyperthyroidism.—G. R. Murray. It is added to salt. *Vide* Sod. Iodid.

For 1924-7 *opinions on World Endemicity and suggestions re Vitamin deficiency causative, see Edn. XIX., p.* 1064. *See also this Vol., pp.* 708, 913.

Different varieties of goitre react differently to various forms of Iodine. Colloid goitre reacts best with simple compounds, *e.g.*, Iodide of Iron: rapidly increasing or recurring varieties of adenoparenchymatous goitre do not react to Iodine, but disappear with Thyroid: patients with myxœdema fail to improve with Iodine: exophthalmic goitre improve only with Lugol's solution—Iodides have little effect and Thyroid increases hyperthyroidism.—A. J. Walton, B.M.J. i./28,83.

Iodine supply in foods higher in N.E. Scotland, where endemic goitre is non-existent than in English countries where it occurs.—J. B. Orr, B.M.J. i./31,460.

GOITRE, EXOPHTHALMIC *see* EXOPHTHALMIC.

Gonococcal Arthritis.—Gonococcus Vaccine, Vaginal Douche with Hyd. Perchlor. Lotion, Mag. Sulph. Solution, hot fomentation, Santalol, Tylcalsin and Tyllithin. See also Gonorrhœa.

'914' preparations the most useful. In chronic arthritis Sodium Iodide intravenously helpful: not impressed by ortho-iodoxy-benzoic Acid.—David Lees, L. i./31,642.

Use and abuse of irrigation in gonococcal arthritis. Irrigating the bladder from the meatus undesirable. Give a Morphine ¼ grain and Atropine 1/75 grain suppository per rectum, to be repeated in 4 hours, add Tincture of Hyoscyamus to the alkaline mixture and omit all local treatment for 48 hours—then lavage with Boric Acid Lotion, Protargol, etc.—H. D. L. Spence, L. i./30,20.

Gonorrhœa.—Buchu, Camphoric Acid, Copaiba, Cubebs, Cyperi Caps., Erigeron Oil, Helmitol, Hexamin, Manganese Butyrate injn., Methylene Blue, Ol. Cedri Atlantic, Pichi, Potassium Salts, Pyridium, Saline Aperients, Salix nigra, Salol, Santal preps., Santalol, Sod. Acid Phosph., Sodii Salicyl, (especially acute posterior urethritis), Uva Ursi, Gonococcus Vaccine, Mineral Waters, *e.g.*, Vittel.

Locally.—Acid. Carbolic. Acid. Salicyl 2% *alcoholic solution compresses. Acid. Tannic, Acriflavine, Argenti Acetas, Nitras Injection and Bougies, Argent, Iodid., Bismuth Oxyiodid., Bougies Urethral, Collapsubes various (see Index), Collargol, Colloidal Ag. and Hg., Glyc. Plumb. Acet. (compresses), Hydrarg. Oxycyanid., Hydrarg. Perchlor., Hydrog. Perox., Iodargol, Iodoformi Cereolus, Iodof. et Eucalypti Cereolus, Manganese Colloidal, Mercurome, Metaphen, Neisser's Bougies, Proflavine, Potass. Permang., Protargol, Resorcin, Zinci Acetas, Chlorid., Permang., and Sulphocarbolas, Zinc Sulphanilas. For female, Pessaries of Ichthyol or Iodine, Argenti Iodidum, Hydrastis, Ovules various,* see text, Zinc and other Ionisation.

Marked success from Permanganate Solution, 1 in 1,000 given to men with instructions.—Sir A. Reid and P. H. Boyden, L. i./19,212.

Gonorrhœa of female treated by solution of Methylene Blue 1, Glycerin 25, Water to 100 by swabbing with gauze plug soaked in the solution *in situ* 24 hours.—R. Stafford Ross, B.M.J. i./20,434.

Gonorrhœa treated by electrolysis. Fluid used is 1% Sodium Chloride and 0·5% Monochloracetic Acid. Current ¾ to 1 m.a.—C. Russ, B.M.J. i./21,1108.

Irrigations with Dichloramine-T 1 in 4,000 also Albargin same strength. Picric Acid 1 in 400 to 1 in 200 is an extremely potent germicide and gives good results when tolerated.—D. Lees, B.M.J. ii./21,480.

Gout.—Acid. Quinic., Acid. Thyminic, Arsenic, Aspirin, Aspriodine, Alasil, Bromal Hydras., Caffein Tri-iodide, Cimicifuga, Colchicine Salicylas (Capsules), Colchicum, Elix. Acid Salicyl. Co., Formates, Guaiacum, Hexamine, Iodine Tinct., Iodolait., Iodolysin, Iron preps., Lithium Salts, Lithion, Magnes. et Sodii Sulph., Phenazon and with Codeine, Phenoquin and Neophenoquin, Piperazin Glyceroph., Phenyl-Aspriodine, Phenyl-Sedasprin, Piperazin and Phenocoll Eff., Piperidine Tartras, Pistoia Powders, Potass. Acet., Cit., Iod., Pot. Chloride as Table Salt, Sodii Bicarb., Benz., Hippuras, Iodid., Phosph., Salicyl, Sesquiphos. and Taurocholas, Solani Ext. Liq., Syr. Ferri Iodidi, Trilactine, Tyllithin, Urea Quinate, Veratrum.

Locally.—Amysal, Borax Solution, Cade Oil, Cocaine Ionisation, Chloroform Liniment, Collod. Salol, Ionised Lithium, Methysal Balm, Nauheim Bath Salts, Ung. Iodermiol, Radium. 'X' Rays are useful. Ra Emanation Inhalation. Salicylic Acid, also Iodine Ionised.

A bacterial toxin is the primary factor. Adequate removal of the intestinal contents at the commencement of attack will reduce the symptoms.—Luff.

Acetic Extract of Colchicum, B.P.'85—is best, the effective dose being 2 to 6 grains.—J. S. Matthews, B.M.J. ii./19,271.

For Acute Gout. Tinctures of Colchicum, Aconite, Jalap Co., and Quinine, of each *p. eq.* 30 drops thrice daily in hot water. Local application compresses soaked with Methyl Salicylate or Laudanum.—Pr., Aug. '26,130.

Colchicum relieves pain and shortens the attack, but of no value in prevention. Phenoquin (Cinchopen) of most value, but may produce unpleasant after-effects. Not to be used where there is any disturbance, *e.g.*, urticaria, or gastric intestinal upset.—G. Graham, Geoffrey Evans, W. Langdon Brown, and others.—B.M.J. ii./26,688.

Granular Eyelids.—*See* Ophthalmia Tarsi.

Granuloma Inguinale.—Antim. Pot. Tart.

Graves' Disease.—*See* **Exophthalmic Goitre.**

Growth, to Stimulate.—Pituitary gland dry (anterior lobe) has been thought to. *See also* Debility, Marasmus, etc.

Guinea Worm.—Emily, a French naval surgeon, succeeded in killing the parasite by injecting Mercuric Chloride solution 1 in 1,000 into the body of the worm.—Sir P. Manson, Tropical Diseases. *See also* J. Graham Forbes, L. i./20,837. Injections tried subcutaneously into the protruding head. N.A.B. 0·15 Gm. in 20 Cc. Distilled Water used.—C. G. Grey, L. ii./20,100. Antimony Tartrate used intravenously.—J. W. S. Macfie, L. i./20,654.

Gums, Inflamed and Spongy. *Locally.—Acid. Carbolic., Ac. Trichloracetic, Alumen, Borated Hyd. Perox., Catechu, Cocaine, Cremor Magnesiæ, Formosyl Mouth Wash, Iodi Tinct., et cum Aconiti Tinct., Iodine Colloidal, Krameriæ Tinct., Liq. Antisepticus, Magnes. Lact., Myrrhæ et Boracis Tinct., Potass. Chlorat., Pastil, Tablet and Troch., Pyrethri Tinct., Sodii Chloras and Troch., Thymaglycin, Zinc Chloride.*

Acute ulcerative gingivitis—Thymol-water, and after drying swabbing with 5% Silver Nitrate Solution, and again washing with Thymol.—C. J. Colyer, B.M.J. ii./18,396.

Touch the gum margins with wool saturated in Chromic Acid solution 1 in 5. After about a minute Hydrogen Peroxide 10 vols. should be applied. Three or four Chlorate of Potash tablets should be sucked daily between meals.—S. H. Woods, Jl. R.A.M.C., Oct., '26,248.

Hæmatemesis.—Acid Sulph. Dil., Acid Tannic, Adrenalin. Alumen, Argenti Nitras, Ergota, Gum Acacia Sterules Injection, Hamamelis, Iron Persalts, Peptonised Milk, Plumbi Acet., Suprarenal Extract, Terebinth. Ol.

Hæmaturia.—Acid. Gallic., Antimony, Camphor, Cannabis, Erigeron Canadense, Ergota, Hamamelis, Rhus aromatica, Terebinth. Ol.

Vesical Injections of Adrenalin, Alum, Gallic Acid, Hamamelis.

Hæmochromatosis.—A peculiar morbid condition showing an accumulation of free iron-containing pigment in the liver, pancreas and retroperitoneal glands.—T. Shawn Dunn, L. ii./21,334 ; S. Linley Heald, B.M.J. ii./22,542.

Hæmoglobinuria.—Ammonium Chloride, Calc. Lact., Iron Tonics.

Hæmophilia.—Calcii Chlorid. and Lactas, Elix. Sod. Lactat., Magnes. Chlorid., Carbonas and Lactas, Hamamelis, Hydrastis, Iron Persalts, and for surface bleeding see local remedies under Hæmorrhage. Phenazone in Ferri Perchlor., see Phenazone. Blood Transfusion.

Hæmoptysis.—Acid Pyrogallic., Acid. Sclerotic., Acid. Sulph. Dil., Alumen, Alum. Aceto. Tart. ***Amyl Nitrite Sterules,*** Atropine, Bromides, Calcium Lactate, Chloral, Digitalis, Ergota, and Ergotin, Gum Acacia with Saline, Hæmoplastin, Hamamelis, Morphine, Nitroglycerin, Phenazone, Rectal Injection of Calcium Chloride, Turpentine, Viscum preps.

Locally.—Spray of Alum or Monsel's Salt Solution, Hæmoplastin, Turpentine.

Very little evidence that Calcium salts, Gelatin, and hæmoplastic sera, of any value by producing clotting. Blood ought to be expelled, not retained in the lung.—H. H. Carleton, Bristol Med. Chir. Jl., Spring, 1928.—Per Pres., Aug. '28,133.

On pharmacological grounds Ergot should do more harm than good. Emetine ¾ grain hypodermically three or four times a day worth trying. Amyl Nitrite and Nitroglycerin has the support of many clinicians. *Adrenalin cannot be justified on experimental grounds*, but given intratracheally over back of the tongue said to be effective (1 Cc. of 1 in 1,000 Soln. in 2 Cc. of water.—Munch. Med. W., Feb.,'28), but this cannot be done in an emergency when blood is welling up into the mouth. Semi-sitting posture best. Coagulen-Ciba hypodermically. May be tried direct into a cavity in severe recurrent and dangerous hæmorrhage.—F. G. Chandler, L. i./30,589.

Hæmorrhage of Wounds.—Calcium Chloride and Lactate, Digitalis, Ergota, Ergotin, Ferri et Quininæ Chlorid., Ferro-Alumen, Gelatin, Gum Acacia with Saline Injection, Terebinth Ol. (*locally, value internally doubtful*). Blood Transfusion. *See also* **Wounds.**

Hæmorrhage from bullet wounds in chest has been controlled by inhalation of Amyl Nitrite.

Local Applications to Wounds and Bleeding Surfaces.—*Acid. Tannic, Albumen, Amadou, Catechu, Cupri Sulph., Cupri Sulphocarb., Erigeron Oleum, Eucalyptus Gum, Eusol, Ferri Perchlorid., Ferro-Alumen. Hamamelis, Hydrog. Perox., Monsel's Solution, Potassium Permanganate, Proflavine, Sphagnum Dressings, Styptic Colloid., Thromboplastin, Tinct. Benz. Co., Turpentine, Zinci Chlorid. Liq. See also* **Wounds.**

Hæmorrhage, Dental, after Extraction.—
Locally.—Adrenalin, Amadou, Ergotinine Injection, Ferri Perchlor., Tannin Tinct. Benz. Co., Turpentine, Zinc Sulphate, Zinc Sulphate with Morph. Acet.
If extensive laceration of the tissue has been necessary, anodyne mouth wash, *e.g.*, Zinc Sulphate 8 grains, Zinc Chloride 6 grains, Morphine Acetate 2 grains. Water to 8 ounces.—Smale and Colyer.
Hot water (blood having an insufficient amount of fibrinogen coagulates at 160° F.) Chloroform Water (2%), Sandarach Varnish.
Potass. Permang. Ung. (4% in Vaseline) or Potass. Permang. and Kaolin with small quantity Vaseline.
Gauze soaked in Oil of Turpentine good.—L. i./22,1006.

Hæmorrhage from Leech-bites, to arrest. *Locally.—Adrenalin, Alum, Tinct. Myrrh., Monsel's Solution.*

Hæmorrhage from the Nose.—*See* **Epistaxis.**

Hæmorrhage, Intestinal—Calcium Chloride, Ergot, Lead Acetate with Camphor or Opium, Gum Acac. Intrav., Suprarenal preps., Turpentine.
Locally.—Styptic Enemata of Adrenalin, Alum, Copper Salts, Gelatinum Calcii Chlor., Monsel's Salt, Tannin.

Hæmorrhage, Uterine and Post Partum.—Amyl Nitris, Camphor Inj., Curschmann's Inj., Cotarnin, Ergot. preps., Ferri et Quininæ Chlorid., Gum Acacia with Saline, Hydrastin, Normal Serum, Pituitary Ext., Strychnina and Salts, Suprarenal preps., Mist. Ergot. c. Ferro. Blood Transfusion.
Locally.—Adrenalin, Alumen, Ferri Perchlorid., Gossyp. and Liquor.
Ergot and Acetic Acid given immediately after birth of child useful to prevent puerperal hæmorrhage.—B.M.J. ii./21,59.
Aluminium Acetate, 2 to 3% solution used, never failed to arrest hæmorrhage from inertia of uterus at childbirth.—Per Pres., Jan., '23,33.
Chloroform by far the commonest cause and often responsible for the death of the child. Ether the best anæsthetic.—E. Vipont Brown, L. i./23,1338.
In excessive uterine bleeding of the menorrhagic type Calcium Lactate, 60 grains a day for a week, and intramuscular injections of Pituitary are useful. Radium Bromide left in the uterine cavity is sometimes curative. Chronic cervicitis contraindication.—S. Gordon Luker, B.M.J. i./27,912.

Hæmorrhoids.—Suitable laxatives are Cascagar, Conf. Piper., Conf. Sennæ, Infus., and Mist Senna Co., Pulv. Glycyrrhizæ Co., 'Hindu Dates.' *Sansiviera Ext. Liq. Stillingia,* Sulphur, Trilactine.
Ext. Coca Liq. *q.v.*, an emergency dose acts like a charm.
Locally.—Acid Boric Ung., Bismuth Oleas, Bism. Subiodate, Coninæ Ung., Gallæ cum Opio Ung., Collapsubes—Bismuth, Calcium Chloride Injection for bleeding, Cupri Oleas, Glyc. and Ung. Chrysarobin, Hamamelid. Liq., Iodine Suppos., Lotio Plumbi Spirituosus, Perfumed Formosyls, Ranunculi Ficariæ Ung., Sod. Morrhuate Injns., Stovaine Ointment, Suppos. Bellad. et Morph., Supp. Cocain et Morph., Supp. Hamam., Conii et Eucainæ, Supp. Hamam, et Hydrarg. Co., Supp. Hæmorrhoidal, Supp. Suprarenal et Morph., Ung. Adrenalin, Ung. Bismuth et Cocain, Ung. Hyd. Subchlor. for irritation, Ung. Thorii Oleat, Zinc Ions.
Injection treatment.—1 to 2 Cc. 5% Phenol in Almond Oil.—A. S. Morley, L. i./28,545. For details of Injection of Carbolic Acid in Hamamelis—latter very painful—see Hamamelis, also Sodium Salicylate.
Calamine freely powdered on a pad useful.—J. C. Lyth, B.M.J. i./21,265.
Quin. Urea HCl and Quinine Urethane Injn. *q.v.*
Inject sphincter ani with local anæsthetic and inject each pile with ½ to 1 Cc. of 96% Alcohol, starting with the higher internal piles. Piles completely shrivelled up by the next day.—per Pr., Feb. '29,132.

Hair, to Promote Growth of, *cf.* SEBORRHŒA.—Bone Marrow, Hæmoglobin and Tonics.
Locally.—Amyl Nitrite, Cantharides, Jaborandi Liniment, Pilocarpine Lotion, Resorcin Lotion, Sublimate in Spirit Lotion.

Hair, to Remove.—Thallium Acetate has been given internally for epilation in ringworm, but we do not advise it.
Locally.—Barium Sulphide, Calcium Sulphide, Corrosive Sublimate Alcoholic Pigment (with caution), Glucose Paste, Pigmentum Thymol, Sodii Sulphid. 25 *to* 40%, *Aq. Sol., 'X' rays, Electric Needle.*

Halitosis. *See* **Breath, Fetid.**

Hay Fever.—*For Diagnosis*: *Protein Skin Tests.*

Arsenic, Aspriodine, Belladonna, Calcii Lactas (full doses), Calc. Brom. intrav., Camphor, Ephedrine, Grindelia, Hyd. Salicyl, Ethyl and Diacetyl Morph. Hydrochlor., 'Old English Fever Mixture,' Peptone injns., Potass. Iodid., Quinine preps., Hay Fever Vaccine, B. Coli and catarrhal organisms, Vaccine Autog. (?). Thyroid.

Locally.—Acid. Salicylic. Pulv., Adrenalin, Bismuth. Co. Pulv., Carbolised Smelling Salts, Comp. Asthma Fluid, Cocain Hydroch. Liquor., Douche of Mercuric Iodide, 1 *in* 2,000, *Eucalypti Ol., Hyd. Perox. Nasal Spray, Menthol, Menthol and Camphor, Nebulæ, Pigment. Antiseptic., Pimento and Eucalyp. Snuff, Pulv. Lobeliæ Comp., Quininæ Collunarium, Stramonium Fumes, Terebene.*

Vestibule of the nose treated with Silver Nitrate 30 grains to the ounce, high up on the outer wall and the floor from ½ to ¾ inch back from the orifice. No application to the mucous membrane.—M. Agar, B.M.J. ii./20,125.

Desensitisation with pollen, or on non-specific lines with Peptone *q.v.*

Headache, Bilious or Sick.—Caps. Ol. Elliott, Chloro-Sodio-Magn. Aper., Colalin, Elixir Gent. Acid., Euonymin, Guarana, Hydrastis, Iridin, Liq. and Tabellæ Pepsinæ et Caffeinæ, Ol. Ricini Aromat., Phenacetin, Phenazone, Podophyllin, Sodii Citras, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Eff. and with Caffeine, Sedeff.

Headache, Congestive or Inflammatory.— Actæa, Colchicum, Ergot, Ammon. Chlorid., Antimony, Hydrarg. Subchlorid., Maricol, Phenazone, Ricini Ol., Salicylates of Sodium, etc., Sedeff, Trilactine, Veratri Viridis Tinct.

Headache, Nervous.—Acid Hydrobromic, Acid Hydrocyanic, Actæa, Amidopyrin, Ammon. Arom. Spt., Arsenic Atropine, Auri Bromidum, Belladonna, Bromides, Butyl Chloral, Caffeine, Calc. Lactate, Camphora, Cannabis, Chloralamide, Cibalgin, Cimicifugin, Elix. Acetanilid Co., Elixir Anti-Neuralgicum, Elixir Caffeinæ, Ergotamine Tart., Ferri Valerianas, Gelsemium, Glucose feeding, Guarana, Ibogaine, Iodo-Caffeine, Iodo-Theobromine, Iron Salts, Kola, Magisal, Phenyl-Sedasprin, Methylene Blue, Migralgin, Nitroglycerin, Phenacetin, Phenazone, Quinin. Valer., Sedasprin, Syr. Neurotonic; Sedeff, Sodii Citras, Theobromine, Lithium Benzoate, Trilactine, Tylcalsin, Tyllithin.

Nitroglycerin with Strychnine (Tabellæ).—Gowers.

If of *dietary origin*, 20 grains of sodium bicarb. with tinctures of gentian and cardamoms will probably have the desired effect. If *due to fatigue*, 10 grains of phenazone with 1 dr. of spt. ammon. arom., and perhaps a little gentian, is indicated. If of *influenzal origin*, 10 grains of sodium salicylate with 6 grains of phenacetin and the same adjuvants will probably act as magic.

Locally.—Formosyl cone.

Migraine, Discussion on.—Peptone therapy promising. Luminal, 1½ grains; *n.s.*, Bromides, Nitrites.—E. Bramwell, B.M.J. ii./26,765.

Two to four drachms of 50% solution of Mag. Sulph. an hour before rising; patient to lie semi-prone on his right side for an hour, and then to take a tumblerful of hot water or hot weak tea; no food for a day or half day previous. Treatment once a week or once a fortnight. Fats, eggs, chocolates, cocoa, coffee and alcohol strictly limited.—H. C. Rook, L. i./27,706.

Lauder Brunton's prescription of 20 grains Sod. Sal. and 15 grains Pot. Brom. always gave relief.—J. W. Yeatman, B.M.J. i./27,215.

Headache Powder.—Caffeine Sodium Benzoate, 0·1 Gm., Pyramidon and Sodium Salicylate of each 0·2 Gm. One or two cachets a day.

Differential diagnosis of abdominal migraine, gall stones, and cholecystitis.—T. C. Hunt, L. ii./30,1001.

Migraine well treated with Peptone injections.—J. Mowbray, L. i./31,813.

Headache due to obstruction of frontal sinuses.—Adrenalin Chloride 1 in 4,000, 1 drachm and Saturated Boric Acid Solution 1 drachm used in an atomizer four times daily gives relief.—E. Podolsky, Int. Jl. Med. & Surg., July '30.

Headache, Post-concussional.—4 to 8 ozs. 50% Mag. Sulph. per rectum.—A. Fieling, B.M.J. ii./30,907.

Headache due to high blood pressure.—Vinum Antim. Tart., Cannabis, Pil. Hydrarg. *See also* **Blood pressure to reduce.**

Heart.—*See* **Cardiac Tonics** and **Dropsy, Cardiac,** also Vasodilators.

Heel, Painful, caused by numerous influences. A prevalent cause of acute pain of sudden onset round the heel is a true teno-synovitis of the tendo Achillis. Compound Mercury Ointment is curative.—W. Fletcher Stiell, Pr., May 22/345.

Hemiplegia.—*See* **Paralysis.**

Hepatic Colic.—*See* **Calculi, Biliary.**

Hepatitis.—Emetine and *see* Emetine Chapter.

Van den Bergh and other liver tests in relation to hepatitis.—B.M.J. i./30, 1043.

Herpes Zoster.—Arsenic *e.g.* Fowler's Solution, Morphinæ inj. hypod. (for pain), Quinine preps., Salines and Saline Aperients. General Tonics.

Locally.—Anodyne Colloid, Carron Oil (or mixed with Zinc Oxide Ointment 3 : 1), Bismuth. Oleas, Calamine Lotion, Cocain preps., Collodium, Hydrarg. Ammon., Cremor Sicc. preps., Ung., Hydrarg. Oleat. Ung., Hydrog. Perox., Ichthyol, Menthol pigment or Unguent (for pain), Perfumed Formosyls, Quinine Ionisation, Zinci Oleat. Ung., Zinci Ung.

Paraffin as an occlusive dressing applied daily gives quick and complete relief from pain.—H. Fox, per Clin. Jl., Mar. 7/23,119.

Herpes zoster ophthalmicus. The following by Gowers gave relief of pain : Caffeine Citrate, Sodium Iodide, Sodium Salicylate, Salicin, of each 5 grains, Phenazone 10 grains. One powder every four hours as required.—S. Lodge and W. O. Lodge, B.M.J. i./23,1085.

Picric Acid in zona. The following lightly applied every second day effects a cure—in no case more than 5 applications necessary. Picric Acid 50 Gm., Sulphur, Ether and Alcohol 50 Gm., of each.—Per Pr., Sept., '23/230.

Neoarsphenamine hypodermically causes disappearance of pains in 3 to 4 hours and disappearance of eruption in a few days. Second injection rarely necessary.—Milian, Jl. A.M.A. i./29,1024.

Hiccough.—Adrenalin Solution, Æther. Spt., Amyl Nitris, Benzyl Alcohol for persistent, Camphora, Capsici Tinct., Chloral, Chlorof. Spt., Extract. Ergotæ Liq., Liq. Ammon. Acet., Lobeline, Morphine preps., Musk, Ol. Succini, Pilocarpine Hydroch. Sedeff, Sodii Bicarb., Trilactine, Valerian Tinct.

Ether intramuscularly (25 to 30 minims) gives relief.

Treatment of persistent hiccup.—C. F. T. East, L. ii./26,140.

Bromides : Belladonna or Cajaput Oil : Morphine with Atropine, if necessary.—A. Salusbury MacNalty, L. ii./29,62.

Carbon Dioxide inhalation the most reliable cure. Place an ordinary paper bag tightly over the mouth and nose and instruct patient to breathe into it. By re-breathing the expired air the concentration of CO_2 in the blood is raised. —L. ii./31,144.

Hodgkin's Disease.—*See* **Lymphadenoma.**

Hookworm.—*See* **Ankylostomiasis and Worms.**

Hordeolum. *Locally.—Argent. Nit., Hydrarg. c. Morphina Oleat., Iodi Tinct., Ung. Hydrarg. Oxidi Flavi, Ung. Metallorum.*

Hydrarthrosis. *Locally.—Cataplasma Salicyl. Co., Scott's Dressing.* See also **Œdema.**

Hydrocele.—Iodine injected, Morestin's Fluid.

Hydrophobia.—*Immediate use of Actual or Electric Cautery, or Nitric Acid or Argent. Nit. Solid, or other caustic paste at hand.* Anti-rabic Vaccine. *See* recent work, Vol. II.

Hyperchlorhydria.—Alkalis, Belladonna, Bismuth and Pancreatin, *see also Vol. II., Exam. of Stomach Contents,* ' Belladonna best to inhibit secretion, Bismuth. Tart. Solub., Bismuth Calc. Phosph., Kaolin, Cerium Oxalate, Glycogen, Mag. Carb. Lev., Nux Vomica (large doses), Ol. Olivæ, Pepsin, Sedeff.

Sodium Bromide, 2 to 3 Gm. a day. Harmless in doses of 6 to 7 Gm. even when continued for some time.—B.M.J.E. i./26,60.

Hyperhidrosis.—*See* **Perspiration, excessive.**

Hyperpiesia and Hyperpiesis.—*See* **Blood Pressure to reduce, Cardiac Tonics,** and **Dropsy, Cardiac;** also **Vasodilators,** Acetocholine and Pot. and Sod. Sulphocyanides are recent remedies.

A monograph on the study of 47 cases by H. Batty Shaw. Its cause is a toxin of protein origin and pre-renal in site of production.—L. i./22,437.

Hyperpiesis thought to be a condition of permanent hypertension. Any systolic pressure persistently as high as 170 mm. mercury or over comes into the category.—Geoffrey Evans, B.M.J. ii./25,1167.

Hyper and Hypo-Thyroidism, *v. p.* 983.

For the cardiac complications of hyperthyroidism Quinidine Sulphate is considered superior to Digitalis.—Pres., May, '27,172.

Hypertrichosis.—*See* **Hair to Remove.**

Hypnotics.—*See also* **Insomnia.**

Basal Hypnosis.—The patient is protected from psychic shock—no recollection of journey to operating theatre or of induction period, allows great reduction of quantity of anæsthetic, abolishes or reduces post-operative nausea and vomiting, and gives amnesia or sleep for definite period after operation. The most valuable basal hypnotics are Paraldehyde or Avertin per rectum, or Barbiturates.—I. W. Magill, L. i./31,353. Would have saved an immense amount of mental anguish and suffering during the war.—Sir F. Shipway, *ibid.*, 354. Mistake to base dosage entirely on weight of patient.—A W. Matthew, *ibid.*

Other pre-anæsthetic Hypnotics are :—Sodium Amytal, Nembutal.

Hysteria.—Actæa, Allii Ol. Essent., Amyl Nitris, Asafetida, Auri Bromidum, Auri Chlorid., Belladonna, Brom-albumen, Calcium, Magnesium, Manganese and other Bromides, Cannabis Indica, Iron Salts, Liq. Antihystericus, Lupuli Tinct., Magisal, Nux Vomica, Ol. Succini, Ovarian Gland, Phosphorus, Pulsatilla, Quinine Preps., Sedasprin, Sedeff, Spirit Ammon. Arom., Syr. Pilocarpin et Pot. Brom., Strychnine, Sumbul, Valerian and Valerianates, Zinc Salts.

Ichthyosis. *Locally.—Resorcin (q.v.) and Salicylic Acid.*

Ileus, Acute.—An emetic. Saline intrav.

A case with stercoral vomiting successfully treated with rectal injection of human bile 2 ounces in Saline 4 ounces. In one case vomited bile was injected into the same patient, but when possible freshly secreted human bile from a cholecystography case was used. This may be kept in an ice-chest for at least a week without losing any of its potency. Ox bile was not satisfactory.—R. St. Leger Brockman, L. ii./27,320,992. Hypertonic Saline (20%) intrav.

Ileus following operations.—Human bile per rectum, 2 ozs. in 4 ozs. Saline every 4 hours. Hypertonic Saline (a quart of 3%) intrav. also useful.—A. H. Southam, L. i./28,42.

Anti-Gas-Gangrene Serum suggested prophylactically prior to operation, as there is evidence of the presence of the exotoxin of *B. Welchi* in the small intestine in such cases. *Dose.*—40 Cc. intrav. and a further 40 Cc. intram. See B. W. Williams, L. i./27,907.

Acute intestinal obstruction—accessory treatments in conjunction with operation : gastric lavage and other procedures as above mentioned.—A. N. Burgess, L. i./29,857.

As in cholera, there is dehydration. Give 2½ to 3½ pints N. Saline intrav.—D. C. Corry, B.M.J. i./31,219.

Ileus, active and paralytic.—H. Tyrrell Gray, B.M.J. i./30,1161.

See also **Constipation, Choline,** etc.

Impetigo.—Remove crusts with Olive Oil or by Boric Starch Poultice, then 10% *Ammoniated Mercury Ointment, Acriflavine, Brilliant Green Ointment, Eusol,* and *see* **Eczema.**

Bockhart's impetigo. Lotion of Pot. Permang. 15 grains, Sod. Bic. 10 grains, water 1 ounce, applied daily.—J. A. Scott, B.M.J. ii./22,977.

Impetigo Contagiosa.—Best results followed the application of Acriflavine Emulsion 1 in 1,000.—J. F. Christie, B.M.J. ii./27,1033.

Impotence.—Arsenic, Auri et Sodii Chloridum, Cannabis Ind. and Cannab. Tannas, Cantharides, Coca and Cocaine, Damiana, Easton's Syrup, Ferri Perchlorid., Formates, Glycerophosphates, Gokhru, Muirapuama, Nux Vomica, Phosphorus, Pil. Potentin Co., Piperazine, Sanguinaria, Strychnine, Testicul. Extract and Injection. Theobrom. Lith. Benz., Yohimbine, Zinci Phosph. Yohimbine to our knowledge caused unpleasant subsequent effects.

Incontinence of Semen.—Arsenic, Auri et Sodii Chloridum, Belladonna, Bromides, Camphor Monobromide, Chloral, Ergota, Ferri Perchlorid., Ferri Phosph. and Ferri Phosph. c. Quin. et Strych. Syrup., Gokhru, Hyoscine, Hyoscyamine, Phenazone, Salix nigra.

Incontinence of Urine.—*See* **Enuresis.**

Indigestion.—*See* **Dyspepsia.**

Inebriety.—*See* **Alcoholism.**

Infant and Invalid Feeding.—Pasteurised Milk, Dried Milk, Almata Puly, Ca. Glyceroph. c. Lacte, Peptonising Powder for humanising milk : Peptonised Milk, Trilactine Milk, Whey Powder, Lactalbumen, Glaxo, Gold Milk, Sod. Cit. Tablets (and with Sodii Bicarb.) to add to milk, Koumiss. Chapter ' Nutrimenta,' Accessory Food Factors, etc.

Inflammation.—Acetanilid, Aconite, Antimony, Belladonna, Digitalis, Gelsemium, Granules d'Aconitine, Hydrarg. Subchlorid et cum Opio, Opium, Phenazone, Quinine, Salicin, Veratrina.

Locally.—Cataplasm Salicyl Co., Glycer. Pb. Subacet., Iodine Ionised, Hirudo.

Influenza.—Aceto-Salicylic Acid, Aconite, Acetanilide, Actæa, Æth. Nit. Spt., Alasil, Ammon. Acet. Liq., Antim. Tart., Aspriodine, Belladonna, Camphor, Cinnamates, Colloidal Metals, Elix. Cinchonidine, Formates, Gelsemium, Hexamine intrav., Hydr. Perchlor. intrav., Ipecac. Co. Pulv., Iodi Tinct., Injection Strych-Arsen. Iod. and Quin., Inhalations of Eucalypti Ol. Menthol, *e.g.*, Ozonic Inhaler (clears the head), Magisal, Mang. Butyrate, Musk for heart failure, Menthol and Camphor, Opium and Morphine preps., Phenacetin., Quinine preps., Phenyl-Sedasprin, Salicinum (large doses), Sal Volatile, Salipyrin, Salol, Sedasprin, Sod. Bicarb., Sod. Nucleinate Intram. Inj., Sodii Salicylas, Tinct. Quinin. Ammon., Tab. Ammon. Quinine Comp., Influenza B. Vaccine, also Comb. Cold Vaccine, Tylcalsin, Tyllithin.

Blood Transfusion.

For *sweating of*—Amyl Nit. $\frac{1}{30}$ minim doses internally.

Post Influenzal Cough, *Lysol Inhalation*, Mist. Apomorph. Co. *See also* **Cough.**

For an ordinary severe case give Aspirin and Dover's Powder, *aa.* 10 grains, after customary aperient, and repeat in 6 to 8 hours; follow by a simple diaphoretic. For *headache*, Phenacetin 5 grains with Caffeine 2 grains. For *foul tongue* Sod. Bic. and Sod. Sulphocarb. For *vomiting* reduce feeds and give Tinct. Iodi 1 m. hourly for 6 doses. For *cough*, Syr. Cocillanæ Co., Syr. Codein, or Linct. Terp. et Heroin. For *sleeplessness*, Bromide or Paraldehyde.—Sir Thos. Horder, L. ii./18,694,871. See also B.M.J. ii./19,695.

Apparent immunity from Influenza at Christ's Hospital School.—Results of Inoculation.—G. E. Friend, L. i./19,105.

Formalin Spray, 6 drachms of 40% solution to $1\frac{3}{4}$ pints of water checked Influenza.—A. Wylie, L. i./19,256.

Cinnamon Oil and Formalin destroy or inhibit growth of B. Influenza.—F. T. Marchant, L. i./19,392.

Pituitary Extract for bronchial congestion with cyanosis and dilatation of the right side of the heart. Tones the heart and bronchial muscles or relaxes them if there is spasm.—W. Crofton, B.M.J. i./19,240.

The following formula was useful in the 1918 epidemic. Quinine Hydrochloride, Camph. Monobrom., Hexamine of each 2 grains, Methylene Blue 1 grain in one capsule; one at onset followed by another in 4 hours: not more than 4 in 24 hours—most cases require but 3. No heart depressants used.—J. H. Hurst, L. i./27,412.

Loss of smell following influenza. Give a long continued course of Strychnine.

Influenzal pneumonia. *Hydrogen Peroxide* transfusion 2 ozs. of '10 vol.' in 8 ozs. of Normal Saline. Gas embolism is not produced. Anoxæmia often markedly benefited. Toxæmia overcome in many cases.—T. H. Oliver and D. V. Murphy, L. i./20,462.

Tinct. Iodi B.P., 20 to 30 m. diluted with 9 Cc. of Normal Saline intravenously tolerated and effect seen in 24 hours.—D. M. Baillie, L. i./19,423.

A gargle of *Chloral Hydrate* 2% every half-hour has been suggested. First Calomel 4 grains followed in 3 hours with $\frac{1}{2}$ oz. Magnesium Sulphate.

Blindness as a sequela. Recovery.—S. E. Denyer, B.M.J. i./22,223.

Ammoniated Tincture of Quinine 20 minims, Sodium Salicylate 10 grains, Glycerin $\frac{1}{2}$ drachm, water to 1 ounce—forms a clear mixture. Possibly a Quinine-Sodium Salicylate formed soluble in the Ammonia.—N. M. Falkiner, B.M.J. i./23,958.

Good results with Aspirin 10 grains, Phenacetin 2 grains—12 powders, one every 4 hours. Temperature falls to normal in 24 hours, and pains in head, back and limbs removed by first powder.—A. D. Kennedy, B.M.J. i./29,714.

Aspirin 5 grains, Phenacetin 5 grains, Dover's Powder 5 grains. Good in all fevers—in some cases 'almost magical.' Cuts short incipient lobar pneumonia. For children over 2 from 2 to 5 grains.—J. L. Kuit, B.M.J. i./29,1066.

1,500 cases successfully treated as follows: At onset give 5 grains each of Quinine Hydrochloride, Phenacetin and Aspirin, and repeat after 3 hours, 6 hours, and fourth dose after another 5 hours. Then give half powder every 3 or 4 hours for 1 or 2 days. For children of 5 to 6, $\frac{1}{4}$ powder: 8 to 10, $\frac{1}{3}$ powder: 12 to 14, $\frac{1}{2}$ powder: 15 to 16, $\frac{2}{3}$ powder: 17, $\frac{3}{4}$ powder.—E. Nesnera, Ar., Feb., '30,231.

Aspirin 5 grains, Phenacetin 2½ grains, Dover's Powder 2½ grains, for influenza in children. Between 2 and 5 years, ¼ dose every 2 hours: from 5 to 12, 1/3 dose 2-hourly, and over 12 full dose. Also valuable in measles and mumps.—H. J. Clutterbuck, B.M.J. i./29,714.

Camphor a valuable drug given as follows: Camphor ¾ grain, Quinine Hydrochloride 3 grains, Aspirin 5 grains. Two powders daily.—Per Pr., May, '29,334.

See also PNEUMONIA.

Insanity.—Fresh Brain Extract has been tried. *See also Mania.*

Insect Bites, *vide* **Bites and Stings,** also PARASITES and PEDICULOSIS.

Insomnia.—Acetanilide, Ammon. Brom., Amyleni Hydras. Antifebrin, Bromoprotein, Butyl Chloral, Camphor, Cannabis Indica and Cannabin, Chloralamide, Chloretone, Chlorobrom, Coca, Codeina, Codeonal, Dial., Diamorphine, Enema Sedativum (post operation), Guttæ Castorei Co., Hyoscyamine, Lactucarium, Liq. Bromo-Chloral Co., Lupulin, Morphine, Narcophine, Nitroglycerin Tabellæ, Opium, Paraldehyde (*intravenously*), Phanodorm, Phenazone, Phenyl-Sedasprin, Pituitary Extract (?), Pot. Brom., Quinine at bedtime, Scopolaminæ HBr., Sedasprin, Sedeff, Sodii Bromid., Soneryl, Stramonium, Strychnine, Sulphonal, Thyroid and Manganese, Trional, Urethane, Valerian, Veronal and Veronal Sodium.

Paraldehyde best mere 'nightcap' in mild cases (heroic doses are mentioned ½ oz. on occasion every four hours); useful for quick action. Hyoscine is the strongest in emergency, and is safe up to 1/50th and probably up to 1/33rd grain hypodermically, *e.g.*, in acute delirious mania.—F. Wyatt Smith, Pr. Sept., 1921.

Intertrigo. *Locally.—Acid Boric. and Ung., Acid. Tannic Glyc., Bism. Ung. Calam. Lotio, Calcii Carb., Calcis Aqua, Camphor, 'Cremor Sicc.' preps., Formosyl Cream, French Chalk, Fullers' Earth, Hazel Foam, Iodi Tinct.* dilute with 3 times volume with *Eau de Paris, Iodine Colloidal, Liq. Carb. Det.* diluted equal vol. c. Eau de Paris, or Ichthyol diluted with water 50 times. *Kaolin, Methylene blue, Pellanthum preps., Perf. Formosyls, Scarlet Ung., Unc. Thorii Oleat, Vaseline, Zinci Cremor and Ung., Zinci Oleat Pulv., Zinc Salicy.*

If of mycotic origin, apply Benzoic Acid and Zinc Oxide 1 Gm. each, in 30 Gm. Petrolatum.—Jl. A.M.A. i./27,1039.

Intestinal Antiseptics.—*See* **Antiseptics.**

Intestinal Obstruction.—*See* **Ileus.**

Intestinal Worms.—*See* **Worms.**

Iodism.—Acid Sulphanilic. Preps. containing ammonia.

Iritis.—Find out cause.—Colchicum, Hydrarg. Perchlorid., and Subchlorid. Iodum, Oil of Gaultheria, Potass. Iod., Pilocarpine, Tylcalsin intrav.

Locally.—Atropina Ung., Atropinæ Sulph. Guttæ and Lamellæ, Belladonn. Duboisine, Dionine Scopolamine.

Itch.—*See* **Scabies.**

Jaundice.—Acid. Nit.-Hyd. Dil., Aloes, Ammon. Chlorid., Benzoate. Elixir Gent. Acid., Calcii Chlorid., Cinchophen (of new born), Euonymi. Ferri Succinas, Hydrarg. cum Creta, Hydrarg. Subchlor., Hydrastis, Iodoform. Iridin, Manganese Sulphate, Pilocarpine, Podophyllin, Salol, Sennæ Co. Mist. Sodii Phosphas and Sodii Phosph. Efferves., Sodii Salicylas, Sodii Succina. Sodii Sulph., and Sodii Phosph. Efferves., Taraxacum, Contramine for Salvarsa. jaundice.

To relieve skin irritation dilute Nitric Acid Lotion or Sodium Bicarbona. Solution, Hazel Foam, Liquor Carbonis., Ung. Rusci. Comp., Formosyl Crea.

Diagnosis of, *v.* Bile in Urine, Vol. II.

JAUNDICE, INFECTIVE. *See* Vol. II.

Jaundice, Epidemic of Campaigns, and of Tetrachlorethane poisoning. the former avoid excess of protein. Give in a mixture of Sodium Bicarbona. 20 grains, Potassium Citrate 30 grains, Sodium Sulphate 30 grains, thri. daily. Calomel should not be given in repeated doses. Treatment in t. latter varies as the case is (1) early (pre-jaundice), or (2) with marked toxæm. or (3) not marked.—Sir W. H. Willcox, B.M.J. i./16,297. *See also* L. i./19,8. 929 and ii./19,419.

TOXIC JAUNDICE. Lumleian Lectures.

Definition, classification, liver functions, morbid anatomy and histolo. and pathology. Coloured plates of microscopical sections of 6 recent fa. cases, comprising Phosphorus poisoning, cirrhosis following N.A.B. injectio. subacute necrosis, alcoholic cirrhosis, eclampsia, and delayed Chlorofo.

poisoning.—Sir Wm. Willcox, L. ii./31,1. A summary of chemical poisons which have caused toxic jaundice.—*Ibid.* 58. Enteric group, protozoal poisons, and auto-intoxication.—*Ibid.* 111; B.M.J. i./31,552,595.

Grave familial jaundice. The prognosis for infants' life is bad. It is thought to be due to fœtal toxæmia of maternal origin. Prophylaxis should consist in care of the mother's diet and administration of intestinal and biliary antiseptics, *e.g.*, Hexamine, Sodium Salicylate, minute doses (1/20th grain) of Calomel, Naphthalene Tetrachloride, Salol, Guaiacol. Ballantyne recommends Calcium Chloride. The infant should have Calomel in small doses.—Sir H. Rolleston, Pr., Jan., 1920. See also A. P. Agnew, Pr., Sept., 1920, p. 217.

Epidemic catarrhal jaundice. M.Health Rep. on outbreak.—B.M.J. ii./27,108

The risk of hæmorrhage in operations to be anticipated by Calc. Chloride 10% 5 Cc. intrav. for three days.—W. E. M. Mitchell, L. ii./27,270.

Kala Azar.—Organic Arsenic Comps. *q.v.*, Antimony Oxide, also Antimony Pot. or Sod. Tart. Injection. Fourneau '309' and Bayer '205' have been reported on. Urea Stibamine.

Iodine by mouth and intravenously gave good results. Forty minims of the following solution given: Iodine 6 grains, Potassium Iodine 6 grains, Distilled Water 1 ounce. Injected intravenously every other day up to 5 injections, and then 10 drops of Tincture of Iodine by mouth thrice daily for a week.—Brachio, I.M.G., July, 1923, C.D., Feb. 23/24,259.

"Kala-Azar" (Oxford Univ. Press), by L. E. Napier, deals with epidemiology, etiology, pathology, symptomatology, diagnosis and treatment. Cure rate with the newer Antimony compounds now 95%.—B.M.J. i./28,1069.

Keratitis, Interstitial.—At Massachusetts Hospital results were decidedly in favour of antisyphilitic treatment.—L. ii./25,764.

Kidney Permeability Tests.—Methylene Blue, Indigo-Carmine, Phenol-sulphone-phthalein, Phloridzin, Uroselectan.

Thorium-Sodium Citrate as pyelographic medium.

Renal disease—diagnosis.—H. MacLean, L. i./25,1213.

Estimation of non-protein nitrogen of the blood, urea concentration, blood urea, etc., in renal disease.—Prof. Maclean, B.M.J. ii./22,1067. See *Vol. II.*

Keloid.—Formalin Injection, Mist. Hydr. Biniodid., *Radium, 'X' Rays.*

Labour.—*See* **Uterus, to Contract.**

Laryngismus Stridulus.—Aconite, Amyl Nitris, Belladonna, Bromides, Chloral, Coninæ Hydrobrom., Emetine, Gelsemium, Piscidia.

Laryngeal Ulcers. *Locally.—Lactic Acid, also Quinine HCl. Acid, as pigment and nebula.*

Laryngitis.—*Find out cause.* Aconiti Tinct. or Pastil., Ammon. Acetat. Liq. and Ammon. Chlorid., Antimonials, Antipyretics, Calomel, Codeine Jelly, Creosote, Cubebs, Diacetyl and Ethyl Morphine, Glycaphorm, Iodoprotein, Linctus (various), Lichenoids, Phenyl-Aspriodine, Pulsatilla, Terebene.

Locally.—Counter-irritation, fomentations, leeches.—Adrenalin, Inhalations of Ammon. Chlorid., Sprays of Creosote, Menthol, Thymol, Tinct. Benzoin Co.; Belladonna and Conium, Juniper, Æther Acetic, Insufflatio Morphinæ et Bismuth and of Catechu, or Menthol, or Tannin, Oxygen and Alcohol Inhalation, Pastils, Ammon. Brom., Pigments of Cocaine, Menthol, etc.

Leishmania Affections.—Antimony injections and Arsenicals.

Local leishmaniasis (Delhi sores, etc.) well treated by scraping and lightly applying solid KOH and dressing.—E. J. E. Risk, B.M.J. i./21,267.

Iodobismuthate of Quinine *per os*, with Emetine intravenously, caused rapid amelioration in American Leishmaniasis.—Per Jl. Trop. Med., Mar. 15/26,98.

Leprosy (see also *Vol. II.*).—Antimony Colloidal, Chaulmoogra preps. *Guaiacol internally and locally*, Milk Injections, Sodium Morrhuate injected, Sodium Chaulmoograte 'A' (Pills, and 'C' Sterules, Cupri Cit. Hydnocarpates).

Vaccine made from a nodule from patient's arm used. Strength 200 mill. per Cc. Initial dose 0·1 Cc. increased.—Sir N. Walker, L. ii./24,542.

For adhesions.—Ac. Trichloracetic Paint.

There is no specific cure, but the following clears up active signs in early cases: (1) treatment of accompanying disease, (2) rectification of diet, (3) gradually increasing exercises, (4) injection of Hydnocarpus Oil and its preparations, (5) external applications, (6) surgical intervention when necessary. Vaccines intravenously are useful in certain cases and in the third stage of the disease: Hydnocarpus Oil is the most efficient treatment in the first and second stages.—E. Muir, R.S.M. Discussion, B.M.J. i./27,284; L. i./27,339.

Ephedrine for nerve pains. At the Mabaica Leper Hospital, British Guiana, the most successful treatment was Ethyl Esters of Chaulmoogra intramusc. with locally Trichloracetic Acid, and in nodular cases solid Carbon Dioxide., Sodium Hydnocarpate and Hydnocreol promising. Sodium Morrhuate and Thymol ineffective. Ionisation or Ultra-Violet radiation accelerates healing of ulcers.—F. G. Rose, Trans. Roy. Soc. Trop. Med., Mar., '28,488.

Recent advances in the treatment and prophylaxis of leprosy.—Sir L. Rogers, B.M.J. ii./29,961.

Leucocythemia.—Benzol Capsules. Arsenical preparations, Cacodylates, Digitalis, Glycerophosphates, Iodine, Iodoprotein, Iron Salts, Marrubin, Phosphorus, Syrupus Iodo-Tannicus, Syrupus Tann-Iodo Phosphoratus.

Leucorrhœa.—Hæmatoxylin, Iron Salts, Manganese preps., Mineral Acids, Myrrh. Vegetable Tonics, Fæxin Ext.

Locally.—Acid. Boric. Lotio, Acid. Carbolic. Lotio, Copper, Zinc or Iodine Ionisation, Alumen, Ammonio-Ferric Alum, Boric Acid in Powder, Formosyl Pessaries, Kaolin Insufflation, Hydrastis, Iodates, Mercuric Chloride, Ovules of Alum or Carbolic Acid, etc., Naphthol, Pess. B. Ac. Lact., Pessus Quininæ, Pot. Permang., Quini. HCl., Tampons, Tannic Acid, Sodii Bicarb. and Belladonna, Sodii Perboras, Tannin and Alum Injection, Zinci Sulphocarb.

Good results with 'dry cure,' *e.g.*, Aluminium Oxide powder or Silver Nitrate.—B.M.J.E. i./26,40.

Leukæmia.—*See* **Anæmia.**

Leukoplakia.—Radium.

Lice to kill.—*See* **Parasites, Animal.**

Lichen planus.—Acid Phosphoric c. Strych., Arsenicals.

Locally.—Acid. Salicyl Ung., Ether-soluble Tar Paste, Liq. Carbonis Deterg. 10 *m. to* 1 *dr. to oz. of water or Calam. Lotion.* See also Eczema.

Liver Abscess, *vide* Abscess, Liver.

Liver Function Tests.—Bromsulphalein, Sod. Salicyl. Van den Bergh Test.

Loa Loa Infections.—L. ii./29,765.

Locomotor Ataxy.—Alum. Chlor., Arg. Nit., Arsamin, Arsenobenzol, Cannabis, Brain and Spinal Cord, Chloralamide, Colloidal Mercury and Silver, Ergot, Hexamine, Hyoscine, Inj. Ac. Nucleinic, Iodinol, Iodoprotein, Keratin, Lipiodol, Mercurialised Serum, Mercury Benz., Morphine, Morrhuæ Ol., Nitroglycerin, Pot. Brom., Pot. Iod., Quinine, Sod. Brom. Intrathecal injection, Sod. Cacodyl., Sodii Salicylas, Strychnine (with acid), 'Three Gland' and 'Four Gland' Elixir and Tablets, Thyroid and Manganese.

Locally.—Mercury Inunctions. Cataphoresis of Cocaine Solution, Radium. Intrathecally. Salvarsanised blood from sane patient.

Lumbago.—Ammon. Chlor., Aspirin, Aspriodine, Belladonna, Camphor Monobrom, Cimicifugin, Colchicum, Elixir Acid. Salicylic. Co., Methyl-Aspriodine, Morphine, Phenazone, Phenyl-Sedasprin, Potass. Iodid., Quinine, Sedasprin, Salicylates, Seden, Tylcalsin, Tyllithin. All Purgatives, *e.g.*, Chelsea Pensioner.

Locally.—Aconite Liniment, Amyl Salicylate, Amysal, Atropinæ Linim., Belladonnæ Linim., Capsici Linim., Chaulmoograte, Chloroform Liniment, Heat Rays, Iodum Oleatum, Menthol Linim., Menthol Plaster, Methyl-Aspriodine, Methysal Balm, Guaiacol, Iodine and Oleogen Salicylicum, Opii Linim., Ung. Iodi Intinctum., Ung. Iodermiol, Picis. Empl., Veratrinæ Ung., 'X' Rays. Static Electricity.

Lupus.—Ac. Nucleinic Inj., Arsenic, Bismuth Injections and *per os*, Cacodylates, Gynocard, Ol., Hydrargyri Biniodidum, Iodum, Morrhuæ Ol., Phosphorus, Quinine preps., Salicin, Sod. Morrhuate Injn., Thyroid Gland, Tuberculins.

Locally.—Acid. Chromic., Acid. Cinnamic, Acid. Pyrogalic Emp. and Ung., Acid. Salicyl. 50% *Ung., Arsenobenzol, Auri chlor., Bism. Oxyiodogall., Chaulmoogra preps., Sod. Morrhuate, Bismuth Iodas, 'Brass Paste' and preps., Camphora Salicylata, Carbonic Snow, Carbon Tetrachloride c. Iodine, Cicatricine, Cupri Oleas, Ethyl Chloride, Finsen Light, Hydrarg. Nitras, Krysolgan, Hyd. Perox., Iodine Ions, Iodoform, Lactic Ions, Lassar's Paste, Oleata, Pot. Permang., Radium, Resorcin, Thiosinamin, Thymol Iodide, Tuberculin, Uranium Oxid. Ung. and Injectio, 'X' Rays, Zinc Chloridum, Zinc and other Ionisation.*

Fehling's Solution injected in lupus.—G. N. Meachin, L. i./19,528.

A treatment using Liq. Hyd. Nit. Acid, Zinc and Carbolic and Brookes' Ungt.—A. R. Somerford, L. i./28,1173.

Dietetic treatment. Light and every agency to improve general nutrition. —B.M.J. ii./30,539.

Lupus pernio treated by Sodium Morrhuate subcutaneously, also by Iodised Cod Liver Oil—5 Cc. of a mixture of Tinct. Iodi 1 in Cod Liver Oil 20. Fever caused. End results good.—O. Blatt, L. ii./30,1410.

Lupus Erythematosus. Arsenicals, Quinidine Caps. and Elix.

Locally.—Acid. Carbonic., Bismuth Oxychlor. Ung., Hydrarg. Biniodid, Finsen Lamp, Aurichlor. Injections, gold and Sod. Thiosulph. Injn., Radium Ung. Thorii Oleat., 'X' Rays.

Mercuric Chloride in Spirit 1 in 240 alternately with a Zinc, Boric Acid and Bismuth Ointment.—R. Thomson, Pharmacist, Elgin, N.B.

Freezing with Carbon Dioxide and ionisation with Zinc Sulphate Solution are the most useful.—J. M. H. McLeod, Pr., April, 22/236.

Lupus erythematosus—modern treatment. Krysolgan and Sanocrysin. H. Haldin-Davis, B.M.J. i./30,432. Sanocrysin, also Colloidal Gold *per os.*—N. Toomey, B.M.J. i./31,801

An autogenous Strepto, Vaccine made from the excised tonsils of a patient was curative.—H. Barber, L. i./22,366.

Lupus leishmaniasis. A leishmaniasis of the skin resembling lupus vulgaris hitherto unclassified. History of case.—J. B. Christopherson, Jl. Trop. Med., June 1/23,203. Antimony Tartrate intrav.

Lymphadenoma.—Arsenic, Coley's Fluid, 'X' Rays. Coll. Manganese has been used.

The co-existence of Hodgkin's disease and amœbiasis. *E. dysenteriæ* and *Councilmania* found in stools.—A. Kofoid, O. Swezy & L. M. Boyers, Ji. A.M.A., Feb. 18/22,532. Also in inguinal gland.—*ibid.* Apl. 15/22,1147. Suggested Hodgkin's disease is amœbiasis of lymphatic glands. In 17,000 examinations of 7,000 persons there was a monthly average of 16·5% showing infection with *E. dysenteriæ.* Amœbiasis endemic in U.S.—*ibid.* Proc. N.Y. Path. Soc., N.S., Jan.-May, '22.

Liberal doses of Neokharsivan intravenously, in conjunction with 'X' Rays.—Sir T. Horder, L. i./25,337.

Lymphadenoma cases put to Intradermal Tuberc. Test conclusion was that the Tubercle B. plays no part in causation.—J. Maxwell, L. ii./30,289.

Yeasts: a study of, to obtain evidence on etiology of lymphadenoma.—K. Stone, L. ii./30,577.

Lymphangitis. Manganese Butyrate, Glycerin and Ichthyol.

Malaria.—Antim. Ox. injn., Arsenicals, Arsamin, Arsenobenzol, Cinchona Febrifuge, Cinchonidine Sulph., Cinchonine Acid HCl., Elix. Berberine, Inj. Strych. Arsen. Iodid. and Quin., Mannitol-Quinine, Methylene Blue, Old English Fever Pdr., Pulvis Quinin. Comp., Quinin. Sulph., Quinidine, Quinine and Quinidine Periodides, Quinine base (for children, also in preference to a salt when there is hæmoglobinuria), Giemsa's injs., Phosphorated Oil, Quin. Hydrobrom. injections, Quin. HCl. internally in preference to Sulph., Salicin, Salicylates, Sod. Cacodyl., Sod. Cit. and Acetates and Tartrates, Steriloid Quinine and Quinidine, Tylcalsin, Tyllithin, Tylmarin, Urea.

Malarial Relapses.—Bold injection treatment with Quinine Acid Hydrochloride combined with Mist. Anticachexia 1 and 2. *See* p. 741.

Neosalvarsan combined with Quinine in the treatment of chronic and relapsing malaria has been well spoken of.—B.M.J. i./24,918.

Pregnancy complicated by malaria.—Quinine, *see* p. 742.

MALARIAL COMA.—Quinine-Urethane intravenously, *q.v.*

Relapsing Fever.—Bismuth Sod. Pot. Tart.

Malignant Pustule.—*See* **Anthrax.**

Malignant Tumours.—*See* **Cancer.**

Malta Fever.—*See* **Mediterranean Fever.**

Mammary Abscess. *See* **Breast, Inflammation of.**

Mango Toe.—Castellani's Paint.

Mania.—Apomorphine, Atropine, Bromides, Cannabis Indica, Chloralamide, Chloral Hydras, Chloroform, Conine, Diacetyl and Ethyl Morphine, Digitalis, Gelsemina, Hyoscine salts, Hyoscyamine, Malourea, Morphine preps., Opium preps., Paraldehyde, Syr. Pot. Brom. et Pilocarpin, Sulphonal.

Marasmus.—Arsenical preps., Conf. Glyceroph. Co., etc. Elix. Hæmoglobin, Emuls. Ol. Morrhuæ ,c. Lecithin, Lecithin, Iron preps., Lacidac, Maltffin, Meat preparations, Milk and Glycerophosphates, Marrubina, Radiostol preps.

Mastitis *See* **Breast, Inflammation of.**

Measles.—Aconite, and Pastil of, Æther Nit. Spt., Ammon. Acet. Liq. Amidopyrin, Ammon. Carb., Belladonna Tincture, Calc. Sulphid., Cinnamon. Powder for prophylaxis, (German measles), Ipecacuanha, Nuclein inj., Potass. Tart. Acidus.

Ol. Eucalypt. all over the body; Carbolic Oil 10% to the tonsils and pharynx. Aspirin, Phenacetin and Dover's Pdr. combined. Tablets are made.

Convalescent Serum in Measles.—Dose now used 5 to 7 Cc. intramuscularly in the buttock.—D. N. Nabarro and A. G. Signy, B.M.J. i./31,12.

Pooled adult serum of 11 or 12 probationers with definite history of measles in childhood used successfully as prophylactic.—L. i./30,519.

The malady is not aborted, but incubation period increased and disease rendered very mild. Immunity lasts for 4½ months.—A. N. Kingsbury, L. i./27,7.

A safe and reliable agent in the prevention and attenuation. First-day injections less satisfactory than injections on the 2nd to 6th day after exposure. A wider recognition of its value and its application in Public Health administration is justified.—W. Gunn, L. ii./28,693. Effective. Donors should be arranged for in fever hospitals. Animal sera not effective.—L. i./29,1104. Method of preparation. Should be used for prevention, *i.e.* production of passive immunity—or preferably, and where possible, for attenuation, *i.e.* production of active immunity. Of no use therapeutically.—D. N. Nabarro and A. Signy, Hospital for Sick Children, L. i./29,1106. Of great value in hospital work.—D. W. Nabarro, L. ii./30,635.

Measles in a man of 57.—B.M.J. i./30,586; even at 76.—*Ibid.* 676.

Aspirin 5 grains, Pulv. Ipecac. Co. 2½ grains, and Phenacetin 2½ grains for measles.—H. J. Clutterbuck, B.M.J. i./30,1153.

Mediterranean Fever.—Acriflavine intrav., Intestinal Disinfectants, *e.g.*, Benzonaphthol, Salol, Hexamine, Trilactine, Vesalvine 'S,' etc. Boil the milk. *M. Melitensis* Vaccine. Dried Yeast for peripheral neuritis of.

Melancholia.—Bile Salts, Bromides, Brominol, Camphora, Coca and Cocaine, Cannabis and Cannabin Tannas, Damiana, Elixir Gent. Acid., Elix. and Emulsio Lecithin, Musk, Nitroglycerin Tabellæ, Nux Vomica, Ol. Elliott Caps., Opium Tinct., Phosphorus, Pil. Potentin Co., Pituitary Gld. Entire, Syr. Glyceroph. Co., Syr. Neurotonique, Tabellæ Erythrol Nitrate, Valerianates.

Menière's Disease.—Acid. Salicylic., Bromides, Caffeine, Gelsemium, Pelletierine.

Diminish fluid intake, so that patient loses weight and is thirsty (fruit and vegetables=fluid). Promote loss of water and give salt-free diet. Bulbocapnin as valuable as Ephedrine is in asthma: 0·1 Gm. daily to prevent vertigo and 0·1 Gm. hypodermically for acute attacks.—W. S. Thacker Neville, B.M.J. ii./31,55.

Meningitis.—*Discover cause* and treat according—*e.g.* if C.S. Antimeningo. Serum, Belladonna, Calomel, Hexamine (?), Iodides, Opium, Veratrum. Lumbar puncture, Antiseptic Injections, Mercurial Injections.

Proteinometer for examining cerebro-spinal fluid to enable diagnosis of acute meningitis.—F. Temple Grey, B.M.J. i./30,205.

Meningitis, Basic.—*Iodoform Ungt. inunction to back of neck.*

Menopause.—Caulophyllum, Viburnum, Hydrastis, Ovarian Substance and Corpora Lutea desiccated.

A neurotic woman at the time of the climacteric may complain of sore tongue. Many of these have achlorhydria, and some benefit with Hydrochloric Acid and Parathyroid with Calcium salts.—Langdon Brown, B.M.J. i./30,529.

The transient hypertension and glycosuria common at the change of life may be due to hyperadrenalism—Cuthbertson. The whole train of instability of the endocrine glands is set going by the ovarian insufficiency upsetting the mental as well as the physical balance, leading to gloominess, apprehensiveness, and irritability. Ovarian preparations, *e.g.* Corpus Luteum, are beneficial, especially for flushing and other vasomotor disorders—the dose advised by makers is often too small. Thyroid when signs of myxœdema. Even mild hyperthyroid symptoms: excitability, tachycardia, flushing, and loss of weight, are definite contraindications. Rest, Bromides, Belladonna, Quinine Hydrochloride, are to be used for hyperthyroidal states.—G. Riddoch, B.M.J. i./30,987.

Menorrhagia.—Acid. Sclerotic., Acid. Sulph. Dil., Amyl Nit., Beberinæ, Sulphas, Bromides, Calc. Chlorid., Cannabin, Cotarnine Phthalate, Digitalis Elixir Ergotæ cum Ferro, Ergot, Erigeron Oil, Erodium Cicutarium, Ferro-Alumen, Hamamelis (see note *infra*), Hydrastis, Iron Persalts, Lecithin Elix. and Emuls., Mist. Senecio Co., Monsel's Solution, Mammary Gld., Ovar. Gld., Pacyl, Pituitary Gland, Dry (entire gland), Plumbi Acetas, Sodii Citras, Thyroid, Viburnum, Zinc Ions.

For severe menorrhagia Tinct. Hamamelidis in small doses does no good, but 1 drachm every 2 hours up to 4 ounces inthe period are effectual.—W.W.W.

Migraine.—*See* **Headache, Nervous.**

Milk, to Increase Flow.—Acid. Lactic., Galega (Goat's Rue), Ext. Gossypii Pulv., Jaborandi, Malti Ext., Meat Extracts, Marrubin, Pituitary Extract (?), *q.v.*, Potass Cit., Thyroid Gland.

During lactation, as soon as milk engorgement shows itself, give Potassium Citrate 15 grains, Ammonium Carbonate 3 grains, Chloroform Water 2 drachms, water to one ounce, four-hourly.—R. Larkin, B.M.J. i./17,765.

Milk, to arrest Flow.—Agaricus albus and Agaricin.

Locally. Belladonna is generally thought useful.

Drugs excreted by the milk which hence affect the child.—Anise Oil, Dill Oil, Garlic, Turpentine, Copaiba Oil (and probably all volatile oils), Sulphur, Rhubarb, Senna, Jalap, Scammony, Castor Oil, Opium, Iodine, Antimony, Arsenic, Bismuth, Iron, Lead, Mercury, Potassium Iodide. These must be given with care. Copaiba or Turpentine will make the milk so nasty that the child will not take it. The purgatives may cause diarrhœa in the child. Opium should not be given in large doses to the mother. On the other hand, Mercury, Arsenic and Potassium Iodide may be given to the child by being given to the mother.—H.W. *See also* Arsenobenzol.

Moles.—*Liquid air, Caustics. Liq. Sodii Ethylatis.*

Hairy Moles.—Treatment should be Electrolysis followed by freezing, Radium, 'X' Rays, cautery, and chemical caustics not advised.—H. C. Semon, L. i./25,1360.

Morphine Habit.—Berberine, Camphor, Cocaina, Codeine in 'Withdrawal,' Coll. Gold, Dionin, Emetine, Hyoscina, Mist. Belladonnæ, Xanthoxyli and Hyoscyami, Nitroglycerin, Nux Vomica, Sodii Bromidum, Sparteinæ Sulphas.

Mosquitoes, to ward off.—*See* **Bites and Stings.**

Mumps.—*See* **Parotitis.**

Myalgia (Muscular Rheumatism).—Actæa, Ammon. Chlorid., Aspriodine, Atropinæ inj. hypod., Elixir Calcii Chlorid., Calcii Lactat., Ibogaine, Iron Salts, Morphinæ inj., Pot. Iodid., Salicylates, Sedeff.

Locally.—Anserine Mulls medicated, Belladonnæ Glycerin and Linim. Capsici Empl. and Linim., Camphor Lin. and Comp., Clove Oil, Ether Spray, Iodi Linim., Menthol, Methyl-Aspriodine, Methysal Balm, Veratrinæ Ung.—See also LUMBAGO.

Myasthenia Gravis.—Lecithin, Electricity.

Mycotic Affections of Skin.—Ethyl Iodide inhalation.

Myxœdema.—Arsenic, Iron Salts, Nitroglycerin, Pilocarpine, Spleen Substance, Strychnine preps., 'Three Gland' and 'Four Gland' Elixir and Tablets, Thyroid and Manganese, Thyroid preps.

Sir J. Cantlie attributed puffiness in various parts of the body in women to the open chest clothing so much in vogue. He had excellent results from Four Gland Tablets. Puffiness cured and depression removed.

Thyroid in myxœdema must be given with exactness. Divide therapy into (1) dose to restore patient to normal B.M.R., (2) the dose needed to maintain. In average adult 0·13 Gm. of dried gland thrice daily can be given. Keep patient in bed at least a week and continue until B.M.R. is between -10 and -5. The maintenance dose is usually about 0·13 Gm. per day, and this must be continued throughout life. If complications are present keep in bed and give Thyroid in very small amounts. If heart is involved, Digitalis and rest before treatment; if anæmic, transfusion; if chronic nephritis exists the dose should be kept small, diet reduced in protein and watch kept on blood urea nitrogen. —C. C. Sturgis and W. B. Whiting, Jl. A.M.A. ii./25,2013-17.

Nasal Catarrh.—*See* **Catarrh, Nasal.**

Nævi. *Locally.—Acid Carbonic, Acid. Chromic., Acid. Nitric., 'X' rays Collodium, Sodii Ethylas, Zinci Chlorid. Iodid. and Nitras.*

Liquid Air. High Frequency Current.

Nævi cured by injection of a minim of Quinine-Urethane into 4 or 5 different places in the nævus, repeated two or three times at fortnightly intervals.—G. B. Dowling, L. ii./29,1251 ; M.A. '31,324.

Nephritis.—*Treat according to the cause.* Aconite, Alkalis, Basham's Mixture, Buchu, Calcii Chlorid., Copaiba, Digitalis with Caffeine, Erythrol Nitrate, Gokhru, Haustus Imperialis, Herdei Dec., Hydrastis, Iodo-Caffeine, Iodo-Theobromine, Koumiss, Pacyl, Pot. Nitris., Pot. Iod., Pulv. Potass. Nitrit Co. (Brunton), Salt free diet, Salyrgan (œdema), Santal Oil, Scoparius, Sod. Salicyl., Strophanthus, Theobromine Aceto-Salicyl., Thyroid, Triticum Repens, Urea, Uva Ursi. Saline Solution injected may prolong life. B. Coli Vaccine (of pregnancy)

Alkaline Salts.—Acetates, Tartrates, Citrates and Bicarbonates of Sod., Pot. and Ammon. probably act on the renal epithelium. The slight excess of saline constituents thus produced in the blood stimulates the renal epithelium to excrete them. They draw with them a certain amount of water and the flow is increased. *Cardiac Tonics.*—Digitalis acts directly on heart muscle and arteries and increases flow of urine by quickening flow of the blood through the kidney,—especially useful where blood pressure is low or the heart failing before resistance too high for it. *Caffeine, Theobromine and allied drugs.*—These stimulate both heart and renal cells. Theobromine-Sodium Salicylate is more potent than Caffeine. Where condition of the kidneys is the main cause begin with Alkaline Salts.—Herringham.

Acute nephritis in childhood. Diuretics are probably harmful and should never be used. In uræmia, Magnesium Sulphate intravenously is of undoubted value.—L. G. Parsons, B.M.J. ii./26,367.

Interstitial nephritis.—Generous milk diet, green vegetables and fresh fruits, restrict animal proteins and limit carbohydrate intake. Prohibit artificially-sweetened puddings, etc.—W. E. Deeks, Diet and Disease, 1927.

Ischæmic nephritis (due to arterial degeneration) and toxic nephritis (an inflammatory reaction to bacterial or other toxins) described.—D. S. Russell, L. i./30,204.

Chronic parenchymatous nephritis with œdema, but without much evidence of Nitrogen retention—large doses of alkali resulted in clearing up the œdema.—A. A. Osman, B.M.J. i./30,337.

Chronic nephritis. Value of alkalis in. To be used except in rare instances, where a preliminary estimation has shown a decrease in the plasma Bicarbonate. May be useful for promotion of diuresis.—A. A. Osman, L. ii./30,945.

The urine should be kept alkaline by giving basic ash foods, *i.e.* milk and vegetables (with reasonable variety of meat, fish, and eggs) together with adequate alkaline salts.—D. M. Lyon, D. M. Dunlop and C. P. Stewart, L. ii./31,1013.

Classification of Bright's Disease.—B.M.J. i./30,206.

Nephrosis.—A group of cases of Nephritis with œdema with good prognosis, treated logically with diets rich in protein, and Thyroid. There is enormous loss of Albumin in cases of this type.—T. Izod Bennett, L. i./31,115.

S. aureus and other organisms suggested as cause of nephrosis.—L. C. Bruce, L. i./31,268.

Nervous Debility, Nervousness.—Acid. Hydrobromic., Acid Phosph., Dil., Arsamin, and other Arsenic preps., Asafetida, Atropine Valer., Antiseptics, *e.g.*, Calomel, Biciniod, Bromides, Brominol (et c. Lact. Exsicc.), Camphora, Cannabis Indica, Caps. Valerian. Co., Catha Milk and Glyceroph., Droitwich Baths, Easton's Syrup, Emuls. Ol. Morrh. c. Lecithin, Ferri Glyceroph., Ferric Salts, Guttæ Castorei Co., Hæmoglobin Caps., Hypophosphites, Ignatiæ Tinct., Lavand. Co. Tinct., Lecithin (Elix. and Emuls.), Liq. Auri et Arsen. Brom., Liq. Auri et Hyd. Brom., Liq. Antihystericus, Liq. Ferri Mang. Pept. c. Hæmo., Liq. Iodo-Ferri Pept., Liq. Testicularis, Magisal, Marrubin Ol. Allii Essent., Ol. Morrhuæ, Ovarian Subs., Phanodorm, Pil. Potentin Co., Phosphorus, Pot. Sulphocyanid., Quinine preps., Salicin, Sedasprin, Syr. Kolæ Comp., Sodii Phosph., Spt. Meliss. Co., Strychnine, Sumbul, Sirop Neurotonique, Suprarenal Gland, 'Three Gland' and 'Four Gland' Elixir and Tablets, Theobromine-Lithium Benzoate, Thyroid (and with Manganese), Trilactine, Valerian preps., Vanadates, Veronal.

Neuralgia.—*Discover cause.*—Acetanilide, Aconite, Actæa, Æther (injected), Alcohol injections, Ammon, Carb., Ammon. Chlorid., Arsenic, Aspirin Atropine Valer. and Salicyl., Belladonna, Bromides, Butyl Chloral, Caffeine

Cannabis, Chloral Hydras, Cibalgin, Cinchonine, Cinchonidine, Colchicine, Conium and Coninæ, Elixir Antineuralgic, Elix. Caffeine, Elix. Gent. Acid. Exalgin, Gelsemium, Hyoscyamine, Iron Salts, Lecithin Elix. and Emuls., Liq. Bromo-Chloral Co., Magisal, Methylene Blue, Neuralgic Pills and Powders, Nitroglycerin, Phenacetin, Phenazone, Phosphorus, Pil. Butyl Chloral c, Camph. et Gelsem., Pil. Potentin Co., Pulv. Morphin. Eff., Quinine, Quin. Urea Inj. (acute facial), Salicylates and Salol, Sedasprin, Sedeff, Syr. Glyceroph. Co., Syr. Hypoph. Co., Syr. Pilocarpin. et Pot. Brom., Thyroid and Manganese, Tylcalsin Tyllithin.

Locally.—Æthyl Chlorid., Aconiti Linim., Aconitinæ Ung., Bellad. Collod. et Tinct. Ætherea, Linim. and cum Chloroform, Chloral Hydras c. Camphor and cum Menthol, Chloroform, Ung. Iodi Intinctum, Menthol Linim., Methyl-Aspriodine, Methysal Balm, Morphinæ Oleat., Oleanodyne, Radium, Salicylic Ions, Veratrinæ Ung.

Neuralgias of the head and neck.—Wilfred Harris, L. i./23,150.

Nocturnal trigeminal neuralgia cured by non-toxic diet, supplemented by a glass at each meal of a solution of Sod. Sulph. 10 Gm., Sod. Phosph. 5 Gm., Sod. Bic. 5 Gm., in a litre of water.—Jl. A.M.A. ii./25,2058.

Trigeminal neuralgia.—Cases treated with Trichlorethylene symptoms relieved.—M. A. Glaser, Jl. A.M.A. i./31,920.

Tic douloureux treated by milk injections, 5 Cc. deeply into gluteal muscles. Definite fever aimed at. Phenobarbital 0·5 to 0·75 grains, with 10 grains Calcium Lactate after meals. Method on trial.—B.M.J.E. ii./30,93.

Neuritis.—*Discover cause.*—Arsenic, Aspirin, Iodides, Mercurials, Salicylates, Sedatives—Nitroglycerin, Phenazone, Electricity.

Locally.—Hydrochloric Acid (q.v.).

Causation and symptomatology of multiple neuritis, alcoholic neuritis, Lead and Arsenical neuritis. Diabetes, beri-beri, diphtheria and other infections associated with.—T. Grainger Stewart, B.M.J. ii./25,461.

Optic neuritis. Treat root cause and Iodine intrav. and Mercury inunctions to temples.

Neurasthenia.—*See* **Nervous Debility.**

Night Sweats.—Acid. Camphoric., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Coto and Cotoin, Guaiacol Carb., Elix. Quinindine, Hyoscinæ, HBr., Iron Salts, Picrotoxin, Quinine preps., Strychnine.

Nipples, Fissures of, and Sore.—*See* **Fissures of Nipples.**

Nits.—*See* **Parasites, Animal.**

Nocturnal Emissions.—*See* **Incontinence.**

Nose Bleeding.—*See* **Epistaxis.**

Nymphomania and Satyriasis.—Bromides, Camphor, Conium, Hyoscine.

Obesity.—Alkalis, Belladonna, Bromides, Fucus, Iodinol, Iodoprotein Iodum, Pot. Iodid., Saccharin *vice* sugar, Sodii Mag. Sulph., Thyroid. Aperient Waters.

Exogenous obesity.—Most cases respond to diet and exercise. The use of Thyroid is seldom necessary or advisable.

Endogenous obesity.—B.M.R. and tolerance for sugar are usually abnormal. When of Thyroid origin, the gland acts as a specific, ½ grain daily increased gradually until patient loses 1 to 2 lbs. a week—even 15 grains a day may be required. In obesity of Pituitary origin, the fat distribution is characteristic, especially round the girdles, and is commonly found in children and adolescents, usually with disturbances of growth and genital function. Give ***Thyroid and whole-gland Pituitary,*** ½ grain of each daily, increasing until patient loses 1 to 2 lbs. a week. Also of value in obesity following childbirth, or at the menopause when diet and exercise are ineffective.—H. Gardiner-Hill, L. i./25,740; ii./25,1035. *See also* J. L. Masterman-Wood, Pr., Sept., '27,165, and our page 984.

Carbohydrate tolerance in obesity.—R. S. Allison, L. i./27,537.

Corpulence. Cause and cure. Some cases are alcoholic in origin.—W. F. Christie, L. i./30,895.

Ocular Pain.—*See* **Eye.**

Œdema.—Calcii Lactas (of feet), Calcii Chlorid., Calc. Gluconate, Crategus, Euphyllin, Salyrgan (injtd.), Theophylline Sodium Acetate.

Locally.—Cataplasm Salicyl. Co., Antiphlogistine, Lin. Pot. Iodid. cum Sapone, Mag. Sulph. Solution, Ung. Hydrarg. Co. (of Ankles).

Milk freed from Sodium Chloride and Potassium Chloride of value in the treatment of œdema. A small quantity of Lactose is added and the milk sterilised.—Bull, de l'Acad. de Med., Nov. 3, '25, per Jl. A.M.A. ii./25,1997.

Œdema, Angioneurotic.—Post-Pit. gland *per os* and inj., Thyroid, B. Coli Vaccine autogenous.

Acute suffocating pulmonary œdema, treated by Pituitary, Atropine, Digitalin, Amyl Nitrite and Antimony Tartrate injections.—B.M.J. i./26,696.

Ophthalmia.—*See* **Conjunctivitis.**

Ophthalmia Tarsi. *Locally.—Acid. Boric. Lotio and Ung., Glyc. Plumbi Subacet. Ung., Copper Sulphate, Hyd. Ox. Flav. Ung., Iodoform Ung. Sphagnol.*

Optic Atrophy, various types of : A large group of substances gives rise to the disease called ' toxic amblyopia ' : Methyl Alcohol, Tobacco, Ethyl Alcohol, Quinine, Lead, Carbon Bisulphide and Arylarsonates.—R. E. Wright, B.M.J. i./23,806.

Orchitis.—Acetanilide, Aconite, Antimonials, Iodoprotein Tabs., Pot. Iod., Saline aperients.

Locally.—Belladonna Glyc. et Ung., Guaiacol, Iodi Tinct., Oleosa and Ung., Mag. Sulph. Solution, Mercurial Plaster, Mercurome (?).

Oriental Sore.—Berberin Acid Sulph. Injn. (3 Cc. of 1—2%), Carbon Dioxide Snow. Emetine, Emetine Injection, Organic Antimony and Arsenic, Phosphorated Oil (Castellani).

Osteomalacia.—Lime Salts, Parathyroid, Phosphorated Oil.

Osteomyelitis.—B.I.P.P.

Otitis and Otorrhœa.—Aconite, Antimonials, Aurinaria, Iodides, Saline aperients, Pneumococcal Vaccine.

Locally.—Acid. Chromic, Acid. Tannic, Alum Insuffi., Argenti Nitras and Bismuth Insuffi., Bromphenobis, Calomel, Calot's Solution, Carbonis Det. Liq., Cullin. Ferri Perchlor., Formosyl, Glucose Solution as swab, Glycerin, Glyc. Hyd. Perchlor., Hyd. Perox., Ichthyol. Iodates, Iodi Tinct., Iodoform Wool and Insuffl., Naphthol, Perfumed Formosyls (diluted), Pot. Permang., Resorcin, Salicylic Acid, Thymol, Turpentine, Xeroform, Zinc Chloride.

Chronic ear suppuration treated by B.I.P.P.—F. Stoker, L. ii./19,200.

Potassium Iodide 10 grains taken well diluted every 4 hours. Every 2 hours external meatus filled with H_2O_2 retained 10 minutes. Nascent Iodine liberated in tissues of middle-ear cleft.—S. P. Sturm, B.M.J. ii./26,1118.

Otitis Media.—Mercurome, Acriviolet.

Spirit drops wrong in acute stage, but after. 10 drops of 15 grains Boric Acid in ounce 45% Spirit to soak for 10 minutes.—F. Holt Diggle, Pr., Jan.; '30,110. For suppurative, paint ulcers c. Arg. Nit. Izal or Resorcin 90 grains to ounce Glycerin Boric Acid.—W. J. Harrison, *ibid.*, 116.

Otosclerosis.—Parathyroid.

Ovarian Pain.—Ammonii Chlorid., Bromides, Castor. Tinct., Corp. Lut. Morphine preps., Ovarian Subs., Phenazonum, Sumbul Tinct.

Oxaluria.—Normally, Oxalic Acid is passed to the extent of 15 to 20 mgr. in 24 hours. If this rise to 30 mgr. it becomes pathological. Choose food rich in Magnesium and poor in Calcium—meat, flour, nuts, apples, peas, potatoes—as Magnesium Oxalate is soluble.—Sir W. Willcox, B.M.J. i./25,605.

Ozæna.—*Locally.—Alum, Creosoti Vapor, Formosyl, Glucose as swab Glycerin (with Glucose), Hyd. Perox. (and Borated), Iodoformi Ung., Menthol spray and pigment, Nebula Formaldehydi, Pot. Permang., Sodii Chlorinat. Liq., Sodii Chlorid., Thymaglycine, Zinci Sulphocarb. Zinc. Chlor. et Sulphas.*

Paraffin, high melting, injected into nasal septum.

Pancreatitis.—Pancreatin Stearettes.

Lœwi's Test for acute pancreatitis.—Instil 4 drops of fresh 1-1,000 Adrenalin Solution into one conjunctival sac ; wait 5 minutes and instil another 4 drops, then wait half an hour. Dilatation of pupil, not infrequently eccentric and often conspicuously oval in form, indicates positive reaction. Negative result implies nothing.—H. Bailey, Pr., Aug., '26,122.

Panniculitis.—Caffein Cit., Magisal and Pyramidon combined.

Paralysis.—Iron Salts, Nuclein Injn., Parathyroid, Post-Pit. preps. Strychnine.

Paralytic Distention of Intestines.—Pituitary Ext. (posterior).

Paralysis, Hemiplegia.—Acetyl-Choline, Arsenicals, Ergota, Iron Salts, Mercurialised Serum, Nux Vomica, Phosphorus, Physostigma.

Paralysis, Paraplegia.—Arsenic Comps. Organic (Stovarsol), Ergot Mercurialised Serum, Phosphorus, Physostigma, Strychnine.

Tryparsamide. Some cases received eight 2 Gm. injections at weekly intervals.—M. Brown and A. R. Martin, L. ii./26,699.

General Paralysis Treated by Malaria.—The principle is that remissions in chronic disease may occur after an attack of acute specific fever. Many methods of producing artificial fever have been tried, *e.g.*, with (1) chemical substances, *e.g.*, Sodium Nucleinate, Sulphur Injections, p. 789, (2) toxalbumins, *e.g.*, Tuberculin, staphylococci, (3) acute disease. The latter is the most efficient. Subcutaneous injections are given of 2 to 4 Cc. of blood from the vein of a patient suffering from benign tertian malaria. The malaria is cured by quinine. Finally, Neo-Salvarsan intravenously.—W. L. Templeton, B.M.J. i./23,895 ; L. i./24,1017 ; i./26,427.

The donor's blood should be given before he receives any Quinine. Onset and course of the inoculated malaria differs from ordinary tertian malaria, and as a rule after 4 or 5 attacks of tertian it becomes quotidian, with often high temperature. As little as 7 grains of Quinine Bisulphate twice daily for 3 days and then once a day for 4 days will rid patient of malarial parasites. Then Neo-salvarsan is given.—J. Gerstmann, B.M.J. ii./25,481.

In treatment of general paralysis a rigor on alternate days is followed by greater benefit than a daily rigor. Allow the primary attack to go on 4 or 5 days then give 3 to 5 grains of quinine to temporarily check and wait for relapse. In this way the temperature is nearly always of the true tertian character with rigors on alternate days.—Leader, On Report of First Results of Laboratory Work on Malaria in England.—Col. S. P. James and P. G. Shute, B.M.J. ii./26,79.

Striking improvement in some cases.—R. Eager, B.M.J. i./28,1025. See also P. A. O'Leary, Jl. A.M.A. ii./28,544.

Rupture of spleen, and death, following induction of malaria. Watch should be kept for undue enlargement of spleen, especially if patient has previously had malaria.—N. G. Harris, L. ii./28,500.

G.P.I. treatment at Horton Mental Hospital by malaria.—L. i./29,287.

Allow at least 8 rigors. Malaria effectively cured by Quinine. No relapses with inoculated malaria—compared with 50% relapses with mosquito bites. Follow up with 3 Gm. Tryparsamide intrav. and 0·2 to 0·4 Gm. Bismuth intram. weekly in 10-week courses with intervals of 4 weeks.—R. Lees, B.M.J. ii./31,338.

For a number of earlier refs., see Edn. XIX, pp. 1080, 1081.

Typhoid Vaccine (Pyrotherapy) as a substitute for above. T.A.B. contg. 1,000 mill., B. typhos. 750 mill., B. paratyph. 'A' and 'B,' to 1 Cc. intrav. for 10 days, starting with 300 mill. total, and rising to 6,000 : then 6 weeks' interval and recommence with 1,500 mill., rising to 20,000 in 10 days, with 4 injections of Novarsenobenzol in the interval. Remission induced. Contra-indications—arteriosclerosis, pulmonary disease, myocardial and advanced cardio-vascular disease, and marked focal infections.—J. M. Mackenzie, Br. Jl. Ven. Dis., 1929, per Pres., Sept., '29,302 ; L. i./29,288.

Protein Therapy in insanity. Patient's serum used. Witte's Peptone 5% intramusc. has been used by Videla.—J. R. B. Robb, B.M.J. i./30,1169.

Rat-bite fever instead of malaria less weakening. Fever controlled by Novarsenobenzol after 32 days. 2 deaths attributed to the treatment in 72 cases.—Per Pres., Sept., '29,301.

Lysozome, a powerfully antibacterial substance in normal saliva. In G.P.I. and Parkinsonism the concentration of it is diminished. The infection in the latter disease is thought to travel *via* the saliva.—L. S. Penrose, L. ii./30,689.

Paralysis Agitans.—Atropine, Bulbocapnine, Hyoscine, Luminal, Morphine.

Parasites, Animal, on Skin. *Locally.—Acetum Cevadiliæ, Anserine Mulls Medicated, Benzol, Chloroform, Cresol Soap (S. M. Copeman), Formosyl and Perfd., Hydrarg. Ammon. Ung., Hydrarg. Oleat., Lefroy's Petroleum Emulsion, Hydrarg. Perchlorid, Lotio and Ung., Lotio Hydrarg. Acetic, Lotio Parasit., N.C.I., Naphthalin Ung., Ol. Cajuput, Ol. Sassafras, Paraffin Liq. (friction with), Phenoloid Disinfectant—dil., Pyrethri Flor. Tinct., Stanni Oleas, Staphisag. Ol. or Ung., Sulphur Baths, Lotion, and Ung., Sulphurated Lime Lotion. Thymol, Westoran, Westropol.*

Clothes Louse.—Soak undervests in 1% Naphthalene and Sulphur in Benzol or Petrol. *See* Naphthalene. Immerse in *gasoline, petrol or paraffin,* or scald the clothes.—From a pamphlet by B. F. Cummings, issued by the British Museum (Natural History) Trustees. 30% *Borax* in powdered *black*

hellebore root stated to prevent re-infection. Lice are *killed* by Cresol Powder 3% (Formalin is *inactive*), Sulphurous Acid, CS_2 and $CCl_4.SO_2$ from burning Sulphur in a stove best for rooms. *Westoran* and *Westropol* have been advocated. *N.C.I.* (*q.v.*) has been much used, also *Vermijelli.*

Para-dichlor.-Benzol is active, but causes burns on the skin. Clove oil also.

The best *powder* is Naphthaline. Menthol is preferable in odor. It repels mosquitoes and fleas as well. For ***Bed Bugs*** Kerosene is best (Iodoform has no deleterious action on these). Pyrethrum is more powerful on bed bugs than on lice.—A. Castellani and T. W. Jackson, L. i./16,39.

Cytisine from Gorse.—Compared with Naphthaline, Cresylic Acid and others. It might be toxic to impregnate garments. Iodoform does not improve effect of Naphthaline. An emulsion of equal parts of common Cresol and Soap used in 5% solution in warm water is best, but might irritate the skin.—A. Bacot, B.M.J. ii./16,447. See also B.M.J. ii./19,603.

Exposure at 60° C. for 10 minutes is lethal to lice and their eggs. *Wax Thermometer* employed. Ampoules containing wax with this and somewhat higher melting point and glass beads would be useful in hot air sterilising chambers.—E. Emrys-Roberts, B.M.J. i./18,509.

See also **Pediculosis Capitis** *infra.*

Parasites, Intestinal.—*See* **Worms.**

Parasites, Vegetable, on Skin. *Locally.—Acet. Cevadillæ, Acid Carbolic, Acid. Chrysophanic Ung. Acid. Sulphuros., Argent Oleas, Cupri Oleat. (for favus), Formol, Formosyl, Hydrarg. Oleat., Hyd. Perox., Lotio Parasiticidus, Perfumed Formosyls, Petroleum (for favus), Phosphor. Ol., Picrotoxin Pigment, Pyrogallol, Sassafras, Sodii Hyposulph., Thymol, Ung. Thorii Oleat.*

Paratyphoid.—*See* **Typhoid.**

Paresis.—Hydrarg. Perchlor. has been used. Sulphur injections. *See also* **Paralysis** *antea.*

Parkinsonism, Post Encephalitic.—Banisterine, Tinct. Bellad., Hyoscine Hydrobrom., Strammonium, Nicotine Injections. *See also* Encephalitis, Epidemic.

The Parkinsonian syndrome, the name derived from its resemblance to paralysis agitans, is the most frequent and characteristic of the sequelæ of epidemic encephalitis.—L. i./25,608.

Parkinsonism together with the 'Apache Type' in encephalitis lethargica. —A. Hancock, B.M.J. i./25,966.

Marked relief in chronic cases of Parkinsonism and disturbance of sleep, following continued administration of Hyoscine Hydrobromide 1/100 grain thrice daily by mouth, but not curative and symptoms returned on suspension. —A. G. Robb, B.M.J. ii./25,646.

Treatment of Parkinsonism syndrome, following encephalitis, by malaria. —R. N. Craig, L. ii./27,860.

Parotitis (Mumps).—Aperients, Saline, Iodides, Phenazone, Salicylates. *Locally.—Glycerin of Belladonna to neck, Iodine, Methysal Balm.*

Pellagra.—*See Vol. II.*

Pediculosis Capitis (Lousiness).—*See also* Parasites, Animal, *antea.*

Head Lice.—Use 2% Phenol. Kills nits, also. If necessary cut the hair short and apply Kerosene, Petrol, Paraffin, Turpentine (*cf.* Sapo Olei Tereb.), Benzene or Xylol—not to be allowed to remain long on the scalp.—B. F. Cummings (British Museum).

Acetic Acid 10% dissolves the substance by which the nit is attached to the hair. Kerosene and Olive Oil equal parts left on for 24 hours and then wash off. 5% Mercuric Oleate in ether is effective.—P. S. Lelean.

For female children where the hair is long, thoroughly soak the hair in 1 in 40 Phenol Solution. It is not desirable for children under five. Patient lies on a bed with head over the edge—the hair hangs over a basin. Sluicing with the Solution is continued for ten minutes, particularly over the ears. The hair is then wrapped in a flannel like a turban.—A. Whitfield.

Sodium Taurocholate (*q.v.*) Emulsion has been used.

Pediculi,—to kill in room, *i.e.* after infection.—Nitrous fumes or Sulphuric Acid as suggested under Malaria, Vol. II.

Methods of killing lice and nits by heat.—W. W. O. Beveridge, L. ii./20,681. Light Wood Tar Oils for destruction of Lice on hair-clad areas.—A. Bacot, B.M.J. ii./21,853. Lice destruction on hair.—E. S. Burt Hamilton, B.M.J. ii./21,968.

Pericarditis.—Aconite, Caffeine, Digitalis, Fæxin, Lotio Quassiæ, Mercury preps., Nuclein, Opiates and Musk (to relieve pain), Potass. and Sodii Iodid., Salicylates.

Belladonna Emp. and Liniment, Leeches, Ice, Blisters.

Peritonitis.—Acetanilide, Aconite, Anti-Gas Gangrene Serum, Colloidal Metals, Digitalis, Hydrarg. Subchlorid. cum Opio, Hyoscyamus, Opium and Belladonna, Phenazone, Tuberculin, Veratrum Viride. For collapse Curschman's Sterules, Caffeine Sod. Salicyl, etc. Vaccines.

Turpentine or Belladonna, Stupes or Poppy-head fomentations. For Pelvic.—Collargol Suppository.

In diffuse septic peritonitis there is fatal absorption through the thoracic duct. This explains why good results follow the administration of Opium.—W. A. Costain, L. i./23,1288.

Treatment of acute cases. Purgatives thought useful in preventing paresis or obstruction—3 grains Calomel given 24 hours after operation. Success depends on early and quick operation, suprapubic drainage, Fowler position, and administration of salines, either by rectum, or, if intolerant, subcutaneously into the chest.—F. Jeans, L. i./25,729.

Anti-Gas-Gangrene Globulins (W.). It has been found that there is clinical resemblance between the toxæmia of acute obstruction and peritonitis with ileus and the toxæmia of gas-gangrene. The serum is given intrav. in 10 Cc. or larger doses.

Peritonitis, Tuberculous.—Glycerin intraperitoneally in desperate case has been given.

Pemphigus neonatorum. *Syn.* **Ritter's disease.** A rare but highly contagious disease of the skin, occurring usually between the 4th and 14th days after birth. *S. aureus* found, of hæmolytic type.—B. H. Jones, L. i./29, 174. 50 cases.—F. G. Collins and H. Campbell, L. i./29,227.

Perspiration, Excessive.—Acetyl-choline, Acid. Agaric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Ergot, Pilocarpine, Picrotoxin, Quinine preps.

Ac. Chromic (of feet), *Diachyli Ung., Emol,* Formosyl, *Kaolin, Naphthol sol. in Alc. and Glyc., Tannin., Zinci Oleat, Pulv. and cum Thymol., Zn. Oxid., Zinc Carb., Zinc Borate, Pasta Zinci et Amyl., 'X' Rays* (see Radiology).

Equal parts of Lead Plaster and Linseed Oil applied as a plaster under a bandage and left on 48 hours.—W. H. Robinson, B.M.J. i./21,216.

Perspiration, Fetid.—Mineral Acid and Vegetable Acids (Calcii Sulphas as in Contrexeville Water), Sulphur (of feet), and Tonics.

Acid. Carbol. Lotio and Ung., Ac. Salicyl. Pulv. cum Talco, Alum. Acet. Lotio, Atropine Lin., Borax, Diachyli Ung., Formosyl, *Glyc. Plumb. Subac. Ung.,* Iodates, Ung. Sulph. Zinc. et Kaolin (of feet), *Zinci Oleat. cum Thymol.*

Pertussis.—*See* **Whooping Cough.**

Pharyngitis.—*See* Throat, Inflammation.

Phlebitis.—Warm compresses and rest the limb with it raised. Potassium Citrate. Hexamine with Sod. Sal. and Am. Benz.—E. G. McCarthy Morris, *see* Hexamine.

Phosphaturia.—Acid Sodium Phosphate and general tonic treatment.

Phthisis.—Acetocholine (for sweats), Acid. Camphoric., Acid. Cinnamic and Salts, Acid. Coumaric., Acid Fluoric and Ammon. Fluoride inhalations, Acid. Hypophosph. and Hypophosphites, Acid. Lactic. and Lactates, Acid. Malic., Acid Sulphuros, Acriflavine hypod., Allium preps., Arsenic (and organic comps., *e.g.*, Arsamin), Aspriodine, Atropine (for night sweats), Auri Chlor. Benzoates, 'Brass Paste' (local), Cacodylates, Calcii Iodid. Elixir, Calcium Colloidal, Cerium Salts, Cholesterin, Cinnaldehyde Caps., Codeine (for cough), Creosoti Elixir and Comps., Crotalin, Durant's Injection, Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrhuæ c. Lecithin, Emulsio Paraff. c. Pancreatin, Emulsio Petrolei, Eusol, Ferri Perchlor., Formalin Inhalant, Glycerophosphates, 'Gold treatment,' Guaiacol, Camph., Carb., Cinnam., or Phosph., Guaiacol-Salol, Hyd. Succinid., Ichthyol Capsules, Inj. Cacodyl. Co., Iodof. and Creosote Oil, Iodof. and Benz. Chloride, Iodof. Glyc. Inj. (Abscess), Iodine, 'Nascent.' Iodoform in Ether intrav., Iodof. and Menthol Inj., Liq. Iodi Fort. (sinuses), Iodi Tinct. (tonic), Lecithin, Liq. Ferri Mang. Pept. c. Hæmoglobin, Iron Salts, Krysolgan, Maltolivine, Marrubin, Mist. Creosoti Co., Mist. Guaiacol. c. Quin., Mist. Sodii Iodid. Co., Muthu's Inhalant, Naphthol-Camphor (inserted in joints), N. Horse Serum, Neb. Formalin, Ol. Morrhuæ c. Creosoto, Ol. Olivæ cum Acid. Oleic, Oxygen, Palladium Chloride, Periodides of Codeine, Quinidine, etc., Phenol Sodii Sulpho-Ricinas, Pil. Niemeyer (fever), Piscidia, Pot.

Bichrom., Quinine preps., Radium, Resorcin (Laryngeal), Salicin, Sanocrysin, Sirop Neurotonique, Sodii Fluoridum, Sod. Hypophosp., Sod. Morrhuate Injected, Spleen Substance, Strych. Cacodylas, Sugar Feeding, Suprarenal Gland, Syr. Iodo-Tannic, Tartar Emetic, Tiodine, Tuberculin Ointment, Philip's by inunction, Tuberculins, Trilactine (intestinal), Trypsin, Tylmarin and Comps., Oxygen inj. (peritonitis), Terebinth, Urea, Vanadates, Vap.-Creosot Co., Vap. Guaiacol Co., Verbasc. Thapsus, Yeast. *For Hæmorrhage* of, Amyl Nitrite Sterules.

Artificial Pneumo-thorax.

Aural tuberculosis in infants. Iodine Tincture weak, then strong, applied. On no account syringe the ear—Hydrogen Peroxide is bad.—W. Stuart-Low, Pr., July 22/57.

Sanocrysin worth trial when the doctor is at his wits' end to try to stay advancing bilateral disease. May produce metallic poisoning and patients lose weight under it. Drugs should not be used for night sweats. Calc. Lact. 15 grains thrice daily, after Calc. Chlorid. intrav. or Hæmoplastin intramusc. for hæmoptysis.—W. A. Dickson, B.M.J. i./30,376.

Tuberculous Glands.—*Acriflavine, Radium, Guaiacol. See also* Phthisis.

Tuberculous Joints.—Zinc Chlor. Solution, Iodised Phenol.

Diagnosis.—*See* Tests, p. 935.

Phytosis of the feet. Induce desquamation. *Whitfield's Ointment.*—M. B. Hutchings, Jl. Trop. Med., Jan. 1/23,208.

Piles.—*See* **Hæmorrhoids.**

Pink Disease. *Syn.* Feer's Disease.—A disease of childhood characterised by 'raw beef hands and feet,' irritability, sweating, cold extremities, tachycardia, raised blood pressure, salivation, hypotonia and phtohobia. Dietetic deficiency a probable etiological factor.—L. ii./31,541. See also R. Hutchison, *ibid.* 979.

Pituitary Disease.—Pituitary combined with thyroid of value *per os.*—L. i./29,555. X-Ray treatment.—F. Roberts, L. i./31,807. *See also* **Acromegaly.**

Pityriasis. *Locally.—Acid. Chrysophanic Ung., Boracis, Glyc. and Lotio Chaulmoogræ Ung., Glyc. Pb. Subac. Ung., Hyd. Oleas, Huile de Cade, Lotio Resorcini, Picis Ung., Perfumed Formosyls.*

The rash of streptococcal pityriasis frequently disappears on applying Zinc Ointment either *per se* or containing Coal Tar 1 to 2%, or Anthrarobin 0·2%.—H. Haxthausen, L. ii./27,373.

Plague.—Serum and Vaccine.

Bubonic plague treated with Neo-salvarsan and Pituitary injection.—R. Mansoor, B.M.J. ii./22,127,190.

Early cases of Bubonic well treated with Iodine intrav. 5 to 10 Cc. daily for 4 days of solution of 18 grains Iodine and 36 grains Pot. Iod. in 4 oz. N. Saline. Mixture containing Pot. Iod. and stimulants every 4 hours. Buboes treated by 1/16 grain Mercuric Chloride in 2 Cc. of water hypod. in lymphatic area drained by groups of glands in which bubo formed.—I.M.G., Feb., '26,63.

For further details, *see Vol. II.*

Pleurisy.—Aconite, Ammon. Acet., Antimony, Apocynum, Bryonia, Colloidal Metals, Morphine preps., Pot. Iodid., Quinine preps., Sodii Salicylas, Sterilised Paraffin, Veratrum.

Locally.—Blisters, Cataplasm, Salicylic Co., Salicylic Ions, Ung. Hydrarg.

Pleuritic Effusion (Recurrent).—Intra-pleural Injection of Formalised Glycerin has been practised. *See* p. 124. Calc. Chlor. *per os.*

Iodoform intrapleurally, as an emulsion in Glycerin, Olive Oil and Ether (1 in 9), in 1 or 2 doses of 1 to 2 Cc., gave good results.—Per Pr., April, '28,264.

Pleurodynia.—*See* **Myalgia.**

Pneumonia.—Aconite, Adrenalin, Ammon. Carb., Cit. and Chlor., Aspirin. Belladonna, Caffeine, Caff. Sod. Salicyl, Calc. Chlor., Camph. Sterules, Chloral and Digitalis (and with Nitroglycerin), Colloidal Metals, Creosot, Carb., Mist, Creosoti et Potass. Iodid., Digitalis, Ethyl Hydrocupreine ***base,*** Ferri Perchlor., Guaiacol, Hyd. Perchlor. *intrav.*, Hydrogen Peroxide *intrav.*, Hyoscyamus, Iodine *intrav.*, Liq. Fe. Acet., Nuclein inj., Ol. Allii Essent., Phenacetin, Phenazone, Pilocarpine, Pot. Nit. and Salt-free diet, Quinine preps., Salicin. Salines. Sod. Cit. (30 to 40 grains every 2 hours), Serum, Saline transfusion, Sod. Salicyl Injn., Strophanthin, Strychnine, Thyroid and Permanganate Inj.

Locally.—Vaccine, Cataplasm Salicyl. Co., Ice Bags (so placed as to include the inflamed area), *Leeches, Oxygen (and with Alcohol).*—Sir Jas. Barr says of no use, B.M.J. i./28,643. *Blood Transfusion.*

A case pulled through by shouting to patient to keep breathing and free use of Atropine, with Vaccine.

A good leucocytosis in early stage is favourable. When defective the old remedy—a large *blister*, may be valuable, *e.g., Liquor Epispast.* freely painted on the back.—Sir J. Barr, B.M.J. i./14,69.

Pot. Iod. 4 grains, Pot Cit. 10 grains, Liq. Ammon. Cit. ½ oz., Water to one ounce—every four hours.—J. A. W. Pareira.

Iodine intravenously. 20 to 30 minims of Iodine Tincture diluted with 9 Cc. of N. Saline. Success.—D. M. Baillie, L. i./19,423.

Patients will stand large doses of Quinine.—S. S. Cohen, Pres., April, '20,167.

A medical man on his own attack. He prescribed his own treatment. Lay on his back with head raised enough for the mouth to be above the bedclothes. Breathing: slow and shallow, and no moving. Diet: extremely spare—drank a lot of water; plenty of fresh air; Gaultheria Liniment good for pains. Morning rises of temperature experienced. Happy termination.—L. i./22,721.

Alcohol (whisky and soda) used freely. Digitalis *q.s.*, to reduce pulse rate. If temp. was 104° F., 1 or 2 grains of Antifebrin added. A high temp. has an exhausting effect on the heart. Opium given to soothe cough. The prescription was therefore: Quinine 1 grain, Digitalis Powder ½ or ¼ grain, Antifebrin 1 or 2 grains, Opium Powder ¼ grain: in powder or pill—one every 2, 3 or 4 hours.—J. T. Maclachlan, B.M.J. i./23,897. *See also* INFLUENZA.

Treatment of acute lobar pneumonia.—John Hay, B.M.J. ii./27,477.

Abdominal distension as a complication of pneumonia may be treated with Pituitary intrav., 0·2 units being a safe dose for a child of 3.—L. B. Cole, L. ii./27,881.

Acute pneumonia in early childhood.—B.M.J. ii./27,582.

Pot. Permang. 1 in 7,000 per rectum 4 hourly and Pneumo Vaccine.—A. A. Hearn, B.M.J. i./28,159.

A review of remedies old and new, all of which have been lauded as 'cures.' It is time that some sort of precise knowledge resulted from the wealth of material.—W. H. Maidlow, B.M.J. i./28,238. A clearing-house required to collate clinical records.—J. S. Dick, B.M.J. i./28,285.

Sodium Nucleinate good, Potassium Permanganate better, and Collosol Manganese best.—H. L. McCormick, B.M.J. i./28,377.

Oxygen of no value in pneumonia—the right treatment is blood-letting.—E. Thompson, B.M.J. i./28,643.

Elimination should be promoted, and Liquor Ammon. Acetatis and Potassium Citrate, long established by experience, are being justified by the exacter knowledge of pharmacology. Sedatives of great value. Morphine need only be withheld in generalised bronchitis with exudate blocking the tubes.—Lord Dawson of Penn, B.M.J. i./31,447; L. i./31,626. Pneumo Vaccine, minimum dose 100 mill., or 200 or 300 mill. of pneumo, strepto and influenza for adults. Temperature falls.—W. H. Wynn, *ibid.*, 448; also N. Raw, *ibid.* Italian Serum also mentioned.

Poisons.—See **Antidotes** under each heading in the text, and **Emetics** also special Chapter at end.

Poliomyelitis, Acute.—Incubation period 2-10 days, average 3-4 days. Home contacts should be excluded from school for at least 3 weeks and if paralytic signs are absent and general health good the child may be readmitted after 6 weeks.

Immune serum 10 Cc. intraspinally daily for several days from one who has passed through an attack and who is free from syphilis taint. *Hexamine* is usually given (10 grains every 4 hours) in acute stage, but doubtful if of much value.—E. Farquhar Buzzard, B.M.J. ii./21,225.

Rest is essential. All patients should be isolated in the acute stage. Incubation period said to be 4 or 5 days.—B.M.J. ii./26,947; L. ii./26,1070,1085,1088.

Ultra-violet light and diathermy useful.—C. B. Heald, L. i./25,1162.

Convalescent Serum of value only when given in the pre-paralytic stage. Intrathecal route safe and effective. Prophylactic use subcutaneously or intramuscularly during epidemics probably preventive.—W. H. Kellogg, Jl. A.M.A. ii./29,1931; see also L. i./29,1205.

Polypi. *Locally.—Hydrogen Peroxide* (and Borated)—styptics.

Aural Polypi—discussion on removal of.—J. S. Fraser and S. Young, B.M.J. ii./22,467. As a matter of routine Zinc Chloride and Alcohol drops instilled for a week before removal of a polypus, when bathed in pus.—Sir J. Dundas Grant, *ibid.*, p. 468.

Polyuria. —To reduce output—pituitary. *See also* INCONTINENCE.

Portwine Stains.—*Radium.*

Post-Partum Hæmorrhage.—*See* **Hæmorrhage.**

Pregnancy—*See* **Uterus, to contract.**

Pregnancy, Vomiting of.—Aconite, Adrenalin, Argent Nit., Arsenic, Belladonna, Bismuth and Pancreatin, Cerii Oxalas, Chloral, Chloroform, Cocaine, Corp. Lutea, Creosote, Hydrocyanic Acid, Iodides, Iodi Tinct. m.i. in ounce Aq. every two hours. Ipecac., Menthol, Morphine preps., Nux Vomica, Pepsin, Phenazone, Pot. Permang., Quinine, Spt. Nucis Juglandis.

To increase elimination of toxic degradation products.—Calomel with Sodium Bicarbonate.

Glucose injections useful.—V. J. Harding and B. P. Watson, L. ii./22,649.

Prickly Heat.—Hyd. Perchlor. Lotion (*q.v.*) made with Dilute Hydrochloric Acid.

Prolapsus Uteri.—Quinine injected.

Prostration.—Amyl Nitrite Sterules, Catha and Coca preps., Oxygen Inhalation, Stimulants. See also Collapse. Rectal Injections, see Enemata.

Prurigo.—Arsenic, Bromides, Cantharides, Iron Salts, Pilocarpine, Quinine, Sodii Carb., Trilactine.

Locally.—Ac. Carbol. Lotio and Ung., Alc. Isopropyl, Borax, Cocaina, Ichthyol, Iodine Colloidal, Iodof. Ung., Liq. Ammon. Dilut., Liq. Hyd. Perchlor. Pigmentum Chloral Co. L.H., Liq. Pb. Subac. Dil., Pilocarpine, Staphisagria, Sulphur Ung., Tar, Ung. Rusci. Co., Ung. Sulph. cum Hydrarg., Anderson's Ointment.

Flexural prurigo in children. Pix Liquida the best locally. Sedative drugs are helpful.—W. J. O'Donovan, B.M.J. ii./30,956.

Pruritus Ani, Vulvæ, etc. *Locally.—'A.B.A.' injected for p. ani. Acid Carbolic. Lotio, and Ung., Acid. Picric, Acid. Salicylic. Ung., Acid Sulphuros. Lotio Alkalis, Aloes, Alum Lotion, Anderson's Ointment, Argent. Nit. in Sp. Æther Nit., Bismuth, Ca. Lact., Calomel dusted on, Carbolic and Cocaine Lotion, Carb. Deterg. Liq. Lotio 2%, Chloretone, Chloroformi Ung., Cocain, Ung., Conii Ung., Ether-soluble Tar Paste, Formosyl, Gallæ cum Opio Ung., Glyc. Plumbi Subac. Ung., Hyd. Oleat et cum Morphinæ, Hyd. Subchlor. Ung., Hydrastis Liquid Extract and Hamamelis injected, Ichthyol Suppos., Lotio Nigra, Mentholeate, Menthol et Boracis Lotio., Naphthalin Ung. and Suppos., Orthoform, Percain Injn., Pot. Cyanid. Lotio., Sod. Silicas intrav., Sod. Salicyl, Sod. Thiosulph., Tampons var., Tannin, Tinct. Cannabis, Ung. Acid. Boric., Ung. Rusci Co., Uranii Oleas, Radium.*

Dhobie's Itch Ointment (see Dhobie's itch) relieves.—R. C. Connor, Int. Conf. Trop. Am., '24,498.

Pruritus ani and pruritus vulvæ of mycotic origin—treatment.—A. Castellani, U.F.C., '25,249.

Olive Oil 1 drachm taken in a little milk at bedtime found to give splendid results.—P.J. i./30,348.

Wash with a sponge dripping with water (no soap), dry well and apply after each evacuation Zinc Oxide and Powdered Starch equal parts with Glycerin *q.s.*, to make a paste. Avoid grease.—B.M.J. i./30,1118: see also 1160.

Carbolised Vaseline 1 in 5 every second or third day. For the irritation an ointment of Menthol and Boric Acid in Lanolin (Ung. Sorbefaciens).—B.M.J. ii./30,86.

Ung. Metallorum well spoken of.—B.M.J. ii./30,626.

Threadworms (*Enterobius vermicularis*) and pruritus ani. Santonin and Calomel. Rectal injection on retiring of 2 ozs. of salt water solution (2 tablespoonfuls to the pint) prevents itching during the night and eventually cures the disease. Auto-inoculation always the cause of prolonged infestation, and the hands must be washed every time the surface of the body or an undergarment is touched.—W. P. Macarthur, B.M.J. i./30,1196; ii./31,336.

Psittacosis (Parrot's Disease). Due to a filterable virus—work at London Hospital.—B.M.J. ii./30,535.

Characterised in man by an atypical pneumonia, weakness and depression, and signs of a profound infection. Time of incubation about 10 days, the symptoms being headache, fever, anorexia, restlessness, delirium, vomiting, diarrhœa and albuminuria bronchopneumonia sometimes supervening. Death occurs in about one-third of cases. Disease more common than is supposed—erroneous diagnosis easily made.—Per Pres., Sept., '29,308—310.

History, case records, clinical signs, incidence.—A. P. Thomson, L. ii./29,115.

A study of 27 cases, five of which died. Prior to the 1929-30 epidemic, practically unknown in this country. The town of Cordova (Argentine) had numerous cases in 1929. Cases in this country connected with green Amazon parrots. Incubation period 8-13 days. Lungs involved in all cases. A typhoid-like state developed: sometimes incessant vomiting: pulse slow in relation to temperature: latter very high from the onset.—R. Hutchison and co-workers, B.M.J. i./30,633.

3 cases with 2 deaths.—H. R. Fisher and R. J. Helsby, B.M.J. i./31,887.

Summary of necropsy.—D. S. Russell, *idem*. 888.

Psoriasis.—Arsenic, Harrogate Water, Hydrarg. Iodid. Viride, Iron Salts, Morrhuæ Ol., Quinine, Sod. Pot. Bism. Tart., Sod. Salicyl intrav., Sulphur, Thyroid, Trilactine, Tylcalsin (and intrav.).

Locally.—Acid. Carbolic, Acid. Crysophanic, Acid. Pyrogall., Acid. Salicyl., Anserine Mulls, Betulæ Pyrolig. Ol., Carbonic Snow, Cocaine Ung., Carbonis Deterg. Liq. Lotio., Formosyl, Huile de Cade, Naphthol, Picis Ung., Pot. Sulph., Rusci Pyrolig. Ol., Salicin, Sodii Carb., Sulphides (in baths), Sulph. Hypochlor. Ung., Thorii Oleat. Ung., Thymol Iodide, Ung. Creosote, Ung. Iodi Intinctum., Ung. Rusci Co., Alkaline Baths.

Ammoniated Mercury 1 dr., Liquor Picis Carb. ½ ounce, Paraffin Ointment B.P. 6 ounces well rubbed in with a piece of flannel. If it fails, try Chrysarobin Ointment avoiding face, hands and scalp and stop treatment if Chrysarobin erythema appears on any part.—H. G. Adamson, L. i./17,223.

Acute rapidly spreading psoriasis treated with Fowler's Solution *per os*, sulphur bath and sulphur 2% in Salicylic Vaseline to the scalp and 1% to the body.—E. Fleming Griffin, B.M.J. ii./21,41.

Baths containing an emulsion of Oil of Cade and Chrysarobin used in extensive cases of psoriasis as an alternative to their application as ointments.—R. Sabouraud, per L. i./23,1318.

Chrysarobin in acute cases may be disastrous. Soothing remedies needed. Oily Calamine with small proportion of Ichthyol. Terpichin, a preparation containing Turpentine, Quinine and a local anæsthetic, intramuscularly, useful: Tar also—Tar Ointment, Salicylic Acid Ointment, Mercur. Nitrate Ointment dilute, Lead Subacetate Ointment, in equal parts. It is tenacious and requires rubbing—this, of itself, is good.—R. W. MacKenna, B.M.J. ii./26,338. *See also* J. H. Heaney, B.M.J. ii./27,1136.

Chrysarobin and X-Rays advised.—E. F. Skinner, B.M.J. ii./26,341.

Monilia as a possible factor. Monilia-like organisms found in 85% of stools of persons with psoriasis; similar, or identical, organisms cultivated, or demonstrated in the skin scrapings in 25%, and present in the blood in 14%. The injection of an emulsion of the killed organism was curative.—M. S. Fleischer and M. Wachowiak, Arch. Dermat. & Syph., per Jl. A.M.A. ii./25,746.

Colloidal Gold *per os*.—N. Toomey, B.M.J. i./31,801.

Ptyalism.—*See* **Salivation.**

Puerperal Fever.—Acid. Boric, Acriflavine Injection, Antifebrin, Antipyrine, Anti-Strepto. Serum (Scarlatina Antitoxic Serum), Calcium Phosphate *per os.*, Ferri Perchlorid., Jaborandi, Mercurochrome intrav., Nitroglycerin, Opium, Peptone intrav., Pilocarpine, Pot. Brom. combined with Belladonna, Quinine (2 grains every four hours) (V. J. Glover, L. i./17,352), Rivanol intrav. Sodium Nucleinate, Streptoco. Vaccine, Sulpharsphenamin, Terebinth. Ol., Saline transfusion, Stimulants.

Vaginal Injections, Mercuric Iodide Solution, or of Cyllin, Irrigation with Injectio Iodi., C.H.W.: also with Acriflavine in Glycerin.

Give a quickly acting aperient, Croton Oil (or 'Oleum Elliott'), Saline injection, Morphine, Thyroid (30 to 40 grains), Nitroglycerin subcutaneously, Veratrum Viride, Pilocarpine, Oxygen.

Acid Sulphuric dil. 25 to 35 minim doses has been advised in puerperal infection, in all labours.

Swabbing out uterus with Iodine, then douche, Strepto. Serum and subseq. Quinine intrav.—B.M.J.E. i./24,68.

Streptococcic Serum, Collosol Iodine intravenously, Sodium Bicarbonate 0·9% intravenously.—G. Fitzgibbon and J. W. Bigger, B.M.J. i./25,773.

Good results from immuno-transfusion, *i.e.*, transfusion with blood from donor immunised three hours previously with stock vaccine.—B. P. Watson, B.M.J. ii./25,1126.

Glycerin of value—assists uterus to drain by promoting flow of lymph.—H. J. Phillips, B.M.J. ii./25,1125.

Iodine intravenously 'a most efficacious remedy,' ½ grain in 2 Cc. Sterile water on 4 consecutive days.—S. R. Ingle, I.M.G., July, '26,346 (1 grain of Potassium Iodide needed to dissolve it.—W. H. M.).

Magnesium Sulphate intrav. Incidence and mortality greatly reduced.—Pres., Jan. '27,19.

Well treated by Colloidal Silver intrav., from 15 to 25 Cc. repeated daily for 4 or 5 days.—A. M. N. Pringle, B.M.J. ii./28,468 ; also H. H. Brown, *ibid.* 548.

Infection due to *B. ærogenes capsulatus* treated by Weinberg Anti-gas Gangrene Serum.—F. Ivens, L. i./29,606.

Infectious puerperal fever apparently derived from a case of scarlet fever—result of an invasion by an air-borne organism and not due to involvement of the genital tract through direct contact. All infected women should be isolated.—A. Leyland Robinson and G. E. Cuttle, L. i./30,67.

Source of Infection.

S. hæmolyticus (throat) carriers are very prevalent but are not a danger to parturient women.—E. F. Murray, B.M.J. i./30,814.

Liability at some seasons greater than others. Strict supervision essential.—E. F. Murray, B.M.J. ii./30,514.

Hæmolytic streptococci associated with severe and fatal puerperal infection. Milder form caused by variety of organisms—non-hæmolytic streptococci, B. coli, etc.—A. L. K. Rankin, L. ii/30,189.

Anærobic streptococci found in blood stream probably as sequel to intra-uterine manipulation and trauma.—L. Colebrook, B.M.J. ii./30,446. *See also* R. R. Armstrong and H. Burt-White, *ibid.* 497.

Puerperal fever in a nursing home.—J. S. Manson, B.M.J. ii./30,558.

Sepsis might disappear if maternity hospitals were outside cities.—L. i./31, 322.

Eight years' investigation at Aberdeen. *S. hæmolyticus* (an aërobe) in uterine cultures in large proportion of cases, and in the bulk it occurred *alone*. Also in septic abortion. *B. coli* in a smaller proportion. Order use of masks and *more careful antiseptic treatment of the hands* advised. Droplet infection from throats of carriers frequent cause.—John Smith, Rept. Dept. of Health for Scotland, B.M.J. i./31,191,805 ; L. i./31,264.

S. hæmolyticus most found, but some cases of acute sepsis due to *Staph. aureus*—cannot be explained as being caused by contamination during investigation. *S. aureus* not a common organism in cultures made from the circulating blood. Antiseptics put into the blood stream not the slightest use.—R. J. Rowlette, B.M.J. i./31,100.

Purgatives.—*See* **Constipation. Purgatives, Hypodermic.**—Aloin, Apocodeine, Colocynthin (may be emetic), Physostigmine.

Purpura.—Calcii Chlorid., Ergot, Iron Salts, Phosphorus, Quinine preps., Oleum. Tereb., Liver Treatment.

Purpura Hæmorrhagica.—Blood Transfusion.

Pyæmia.—Autogenous Vaccine.

Pyelitis.—Benzoates, Collinsonia, Erigeron Oil, Hexamine Camphorate, Pyridium, Vaccine.

Locally.—Mercurome, Colloidal Silver.

Fluid intake restricted, not more than 300 Cc. daily from the 2nd to the 4th day. 1 Gm. Hexamine and 1 Gm. Sod. Salicyl. with a little Phosphoric Acid 3 times a day. Hot air baths twice a day. From the 5th to the 7th day drugs discontinued and the system flushed with large quantities of water.—Daniel, per Clin. Jl., June 27/23,310.

Pyelographic Solutions.—Sod. Iodide, Sod. Iodo Methane Sulphonate.

Pyloric Stenosis.—Atropine.

Pyorrhœa Alveolaris.—Colloidal Silver hypod., Vaccines.

Locally.—Antiseptic mouth washes, e.g. Lotio Acidi Citrici et Phenolis, Argyrol, Eusol, Emetine HCl. Solution ½% applied locally and injected. *Cremor Magnesiæ, Formosyl T. Paste. Vide* Emetine and Pigmentum Ipecac. et Arsen.

L. Williams decries the fashion of wholesale teeth extraction or ' pyorrhœa ' and quasi-pyorrhœa—Vitamins are necessary.—B.M.J. i./23,1012.

Animal parasites of the mouth in relation to dental disease. Description of protozoa found in pyorrhœa alveolaris, and animal experiments infecting with these organisms.—C. A. Kofoid, H. C. Hinshaw and H. G. Johnstone, Jl. Am. Dent. Assn., Aug. '29.

Pyrosis—Acid. Hydrocyanic., Acid. HCl. Dil., Acid. Nit. Dil., Acid. Sulphuros., Bismuth preps., Carbo Ligni, Cerii Oxalas, Cremor Magnesiæ, Magnesia, Sod. Bic., Sodii Sulphocarb.

Quinsy.—*See* **Throat Inflammation.**

Rabies.—*See* **Hydrophobia.**

Rat-bite Fever.—Arsenobenzol.

Raynaud's Syndrome.—Acetylcholine.

Rectum and Colon Ulceration.—*See* **Colitis.**

Rectum, Prolapse of.—Alcohol Injection *vide* Alcohol Refs.

Relapsing Fever.—Sodium Arsanilate. *See also* **Malaria.**

Remittent Fever.—*See* **Malaria.**

Restoratives—*See* **Debility.**

Rheumatic Endocarditis.—*See* **Endocarditis.**

Rheumatism, Acute Articular.—Acid. Phosphoric, Acetanilide, Aconite, Acriflavine Injn., Actæa, Aspirin, Aspriodine, Benzoates, Caffeine-Chloral, Colchicum, Fæxin, Ferri Perchlor., Guaiacum, Lemon or Lime Juice, Lithion, Magisal, Opium, Ozonic Ether, Phenacetin, Phenazonum, Phenyl-Aspriodine, Phenocoll, Pot. Acet., Bicarb., Cit. or Nit., Quinine preps., Salicin (bold dose), Salicylates, Salol, Sedasprin, Sod. Bicarb., Sod. Sesquiphosph., Thyroid and Manganese, Tylcalsin *per os* and intrav., Tyllithin, Tylmarin, Tylnatrin *per os* and intrav. Strepto Vaccine, Veratrum.

Locally.—Methyl-Aspriodine Balm and Linim., Methysal Balm, Ung. Agotan. *See also* Absts. under Sodium Salicylate, Aceto-Salicylic Acid, Salol, etc.

B. Coli Vaccine intravenously in recent arthritis.

Rheumatism, Chronic.—Actæa, Alasil, Antimonium Sulphurat., Arsenic, Aspirin, Aspriodine, Bisciniod, Caffein Salicyl., Cinchonidinæ Salicylas, Colchicum, Conf. Guaiaci Comp., Ethyl Iodid., and Salicyl., Colloidal Metals, Ferri Iodid. Syr., Ferri Salicylas, Formates, Gaultheriæ Oleum, Gelsemium, Guaiacol Carbonate, Piperazine, Quinine Periodide, Iodoprotein, Lithii Hippuras, Lithion, Magisal, Manaca, Methylene Blue, Ol. Succini, Pelletierina, Phenoquin, Phytolacca, Pilocarpina, Piperazin, Benz. and Glycerop., Podophyllin, Pot. Iodid. et cum Quinina, Quinin. Hydriodid., Radium Emanation Inhalation, Rhus, Salol, Sodii Boro-Salicylas, Sodii Formas, Sulphur, Trilactine, Tylcalsin, Tyllithin, Xanthoxylum.

Locally.—Alcoolat de Fioraventi, Atropinæ Linim., Bellad. Linim. and Linim. Co., Betol, Camph. Co. Linim., Capsici Emp. and Linim., Chloral cum Camphor., Caffein and Sodium Salicylate injected, Croton Oil Lin., Ethyl Chloride Spray, Eucalyptus Oil, Glycopasta Aconiti et Bellad., Iodine, Cocaine Solution and Chloroform Ionised, Lin. Menthol Comp., Lithium Iodide Ionised, Mag. Sulph. Inject., Methyl-Aspriodine Balm and Lin., Methysal Balm, Methyl Salicyl. and Plaster and Ung., Ol. Succini, Potassii Lactas, Sal. Marin. Artif., Sassaf. Oil, Sod. Salicyl. c. Sod. Iodid. intrav., Ung. Agotan, Ung. Iodermiol, Ung. Iodi Intinct., Ung., Acidi Salicyl.

Removal of offending teeth. Colon Lavage.

Envelop joints in hard paraffin melted.

Guttæ Iodi (Farrer). Iodine 4 grains, Alcohol 90% 1 drachm, Glycerin to 1 ounce. *See also* TINCT. IODI FR. CX. 1908, for ' intensive ' treatment.

Rheumatoid Arthritis. *Seek infective focus.*—Actæa, Adrenalin, Alasil, Arsenic, Aspirin, Aspriodine, Colchicum, Ferri Iod. Sacch., Formates, Guaiacol Carb., Inj. Guaiacol-Iod. Camph., Formates, Hexamine, Hyd. Salicyl., Iodoprotein, Iodolysin, Lithium, Magisal, Morrhuæ Ol., Pot. Brom. and Iodid., Sedasprin, Sulphur Injections, Strontii Salicyl *intrav.*, Tylcalsin, Tyllithin.

Artificial abscess by Turpentine Injection (non-specific immunisation).

Locally.—Hyd. Oleas c. Morph., Radiant Heat, ' X ' Rays, Ung. Sabinæ with Cantharides, Iodine and Salicylic Ions, Blister applied to the spine. B. Coli Vaccine intravenously.

Protein Shock, *e.g. Milk injections,* 4 Cc. increased, or T.A.B. Vaccine or possibly a vaccine made from teeth or bowel. *See* Absts., p. 668.

Pathway of infection—mouth, teeth, gums and tonsils.—G. L. Kerr Pringle, Pr., Oct. 1921, p. 229.

The terms 'rheumatoid arthritis' and 'osteo-arthritis' are unsatisfactory and confusing: 'Chronic arthritis' preferable.—A. G. Timbrell Fisher, B.M.J. ii./25,599.

Association with thyroid function. Thyroid useful; some remarkable successes.—L. i./25,986. Confirmation by L. J. Llewellyn, L. i./25,1203.

Arthritis in childhood.—F. J. Poynton, L. i./25,807.

Conference on Rheumatic Diseases, Bath, May, 1928.—B.M.J. i./28,852-58.

Rheumatic diseases—a good classification dealing with rheumatic fever (acute rheumatism), subacute rheumatism, muscular rheumatism, lumbago, sciatica, rheumatoid arthritis, osteo-arthritis, gout (acute and chronic), in tabular form.—A. Glover, L. i./30,609.

Classification and enumeration of some remedies.—W. S. C. Copeman, B.M.J. i./30,942; *see also* N. Mutch, B.M.J. i./31,383.

Tonsillectomy in chronic arthritis. The tonsils are a focus of infection in certain cases.—A. B. Pavey-Smith, L. i./29,170.

Excessive pain relieved by lotion as follows: Potassium Bicarbonate ½ ounce, Tincture of Opium 2 drachms, Glycerin 2 ounces, Rose Water to 12 ounces. Apply warm on lint.—E. Podolsky, Int. Jl. Med. & Surg., July, '30.

The old Uric Acid theories and restriction of meat hold no sway now. Plombières' treatment good. Pot. Permang. *per os* and by injection good adjuvant. Nitrites have favourable influence on blood sugar curve.—B. Cohen, B.M.J. i./30,70.

Acute and subacute rheumatism in children. Sod. Salicyl. intram. of advantage. Temperature normal in 24 hours and pains gone. 1 grain for each year in 1 Cc. water once a day for 4 days—but does not control rheumatic cardiac disease. There is no specific drug for the cardiac infection, but cases benefit by Digitalis.—E. C. Warner, L. ii./30,719.

Rheumatoid Arthritis can be cured by combined Hexamine treatment (*see* p. 451).—E. G. McCarthy Morris.

Treatment by a combination of blood transfusion and Insulin of considerable benefit when other methods fail.—W. S. C. Copeman, B.M.J. ii./31,1130.

'Pyretic' treatment used at Lansdown Hosp., Bath, since 1890. Hot blankets bath, vapour cabinet and couch. The principle is to envelop the patient in a warm (100-105° F.) moist atmosphere (exposure to visible steam being avoided). *See* P. Wilde, The Pyretic Treatment, 1928; Charles Sundell, Archives of Med. Hydrology, May, 1927.

Rhinitis.—*See* **Catarrh, Nasal. Rhinitis Atrophic.**—*Borax.*, Zinc Sulphanilas packing. *See also* Catarrh, Nasal.

Rickets.—Acid. Phosph. Dil., Calcii Hypoph. Syrup., Calcis Liq., Calcii Chlorid. Elix., Calc. Lactas, Phosph., Lacto-phosph., Syr. and cum Ferro., Cinchona preps., Emulsio Ol. Morrh. c. Glyceroph., Ferri Phosph., Syr. Ferrii Iodid., Foods A, B and C, Glyceroph., Glyc. Glyceroph. c. Med. Rub., Lecithin Emulsion, Liq. Ferri Hypoph. Co., Liq. Iodo-Ferro-Mang. Pept., Malt Ext. c. Hæmoglobin, c. Pancreatin, etc., Marrubin (and Comps.), Milk and Glyceroph., Morrhuæ Ol., Ol. Morrh. Phosp., Phosphorated Oil, Radiostol preps., Sodii Phosph., Sulphur, Thymus, Thyroid, 'Three Gland' and 'Four Gland' Elixir and Tablets, Trilactine. *cf.*, Accessory Food Factor Chapter.

Sunlight, Artificial 'sun.'

Rigg's Disease.—*See* Pyorrhœa Alveolaris.

Ringworm.—*See* **Tinea.**

Rodent Ulcer. *Locally.—Chromic Acid, Scarlet 'R,' Carbonic Snow, Radium, 'X' Rays, Zinc Ions.*

Saint Vitus's Dance.—*See* **Chorea.**

Saliva, to promote.—Ether, Ginger, Horseradish, Iodides, Jaborandi, Mercurials, most Emetics, Mustard, Pelletierine, Pepper, Physostigma, Pyrethrum Glyco-gelatin (Pastils of), Sorbus Aucup. Berries, Tab. Formalin, Tobacco.

Saliva, to check excessive.—Acid. Hydroch. Dil., Atropine and Belladonna, Chlorates, Coto, Picrotoxin. Of syphilis after excessive Mercury: Sodium Chlorate.

Locally.—Acid. Boric., Alumen, Borax, Chlorates, Creosoti Vapor, Formosyl.

Sarcinæ.—Ac. Sulphuros., Betanaphthol, Bisciniod, Calcii Chlorid., Salol, Sodii Hyposulphis, Sodii Metabisulphis, Sodii Salicylas, Sodii Sulphis.

Lavage.

Scabies. *Locally.—Ac. Sulphuros, Calcis Sulphurat. Lotio, Cyllin, 'Danish' Ointment, Hexamine intrav., Hydrarg. Perchlorid, Ung., Formosyl and Perfumed, Nascent Sulphur, Liq. Carbonis Detergens, Lotio Alba Mackenna, Lotio Boeck, Manganese Butyrate, Naphthalin Ung., Naphthol Ung., Peru Balsam, Pig. Thymol, Potass. Sulphurat., Balnea, Styracis Ung., Sulphur Ung., Ung. Ac. Salicyl* 50%, *Ung. Resorcin Co., Ung. Rusci Co., Ung. Thorii Oleat.*

Scalds.—*See* **Burns.**

Scarlatina.—Aconite, Ammon. Carb., Antistreptococcic Serum, Belladonna, Calcium Sulphid., Ozonic Ether, Pot. Cit., Potassii or Sodii Chloras.

Locally.—Antiseptic Gargles and Mouth Washes, Compress of Salicylic Acid 2% *in Alcoholic Solution.*

Renal complications in scarlet fever. To prevent. Alkalis given—Sodium Bicarbonate 25 grains with Potassium Bicarbonate 5 grains four-hourly until urine is alkaline to litmus—in 3 or 4 days. Also Tinct. Iodi Mitis 20 minims in milk four-hourly, and Thyroid 4 grains once a day for a fortnight, as suggested by McDonagh's work.—B. A. Peters, B.M.J. i./31,1094.

Scar Tissue.—To relax and remove. From gullet, stomach, also uterine adhesions.—Cicatricine and Inj. Thiosinamin Sod. Salicyl.

Sciatica.—Acetanilide, Actæa, Alasil, Alum Aceto-Tart., Aspirin, Aspriodine, Bisciniod, Cap. Colch. Salicyl., Codein, Colchicum, Conf. Guaiac. Comp., Ether Inj., Lithii Citras, Methylene Blue, Morphinæ hypod., Oleanodyne, Phenazone (and Injected c. Cocaine), Opium Ext. with Valerian or Suppos. with Cocain, Piperazine, Pot. Iodid., Quin. Salicyl., Salol, Sedasprin, Sodii Salicylas, Strychnine, Terebinthinæ Ol., 'Theo-Sod.-Acet.', 'Theo-Sodo-Form,' 'Theo-Sodo-Sal.', Thyroid and Manganese, Triiactine, Tylcalsin, Tyllithin, Tylcalsin intrav., Quin-Urea inj., Vaccines.

Locally.—Aconitinæ Ung., Bellad. Lin., Chlorof. Lin., Ether inj., Menthol c. Camph., Menthol Lin., Methyl-Aspriodine, Methysal Balm, Ung. Iodermiol, Veratinæ Ung.

Injection into sciatic nerve, where it crosses neck of femur, of 1% solution of Quinine and Urea Hydrochloride, specific for sciatica.—B.M.J.E. ii./26,96.

Sclerosis, Disseminated.—Bulbocapnine, Parosan, Sod. Cacodyl, Typhoid Vaccines Intravenously (Sir J. Purves-Stewart).

Spherula insularis, the name given to what is thought to be the causal organism of disseminated sclerosis. Autogenous vaccine employed.—Sir J. Purves-Stewart, L. i./30,560,612. Existence not corroborated.—M.R.C., B.M.J. i./31,425,513,514.

Scrofula.—Arsamin and other Org. Arsenic, Calc. Lact., Calcii Chlorid., Calcii Phosph., Calcii Sulphid., Elix. Hæm. c. Lecith., Ext. Malti um Iodinol, Ferri Iodid. Syr., Ferri Phosph., Hyd. Iod. Virid., Iodoprotein Tabs., Iodum, Marrubin and Comps., Morrhuæ Ol., Quinine preps., Sodii Phosphas, Sirop Neurotonique, Syr. Iodo-Tannic, Syr. and Vinum Tann-Iodo-phosph., Chaulmoogra Oil.

Locally.—Pot. Sulphurat., Lotio Alba, Mackenna.

Intrasacral epidural injection in treatment of sciatica. Normal Saline, about 100 Cc., apparently as good as various strengths of Novocaine.—W. Evans, L. ii./30,1227.

Scurvy.—Arsenic and Iron, Calc. Lact., Lime or Lemon Juice, Phosphorus, Potass. Chloras and Citras, Red Bone Marrow, Sodii Citras, Sodii Lact.

Scurvy, Infantile.—Lemon Juice after removal of acids—the equivalent of 6 to 12 lemons daily.—A. Harden, S. S. Zilva, and G. F. Still, L. i./19,17.

Orange Juice concentrated at 37° C. under a partial vacuum found much more efficacious than Lime Juice in the prevention of scurvy.—J. L. Priston, Jl. R.N.M.S., Jan., '26,1.

Cf., 'Water-Soluble C' Accessory Food Factors.

Sea-Sickness.—Acid. Hydrobromic., Antipyrine, Amyl Nitris (inhaled), Bon Voyage, Chloralamide, Chloral Hyd., Chloroform and Tinct. Co., Chlorof. Caps., Cocainæ Hydrochlor., Glucose Feeding, Hyoscyamina ($\frac{1}{200}$ gr. *per os* good), Iodi Tinct., Morphinæ inj. hypod., Nitroglycerin Tablets ($\frac{1}{500}$ gr.), Phenazone, Pot. Bromid., Sedasprin, Sedeff, Sod. Brom., Sodii Citras *per rectum*, Sodii Nitris, Malourea and Sodium Malourea.

Counter-irritants to stomach, Ice-bags to the spine.

Ipecacuanha Wine to 2 to 3 minim doses is specific.—A. T. Thompson.

Sedative treatment: Liquor Iodi Fortis, Dilute Hydrocyanic Acid, *a.a.* 12 minims, Water to 6 ounces. One ounce every 10 minutes. Four doses

taken effectual. Then *Aperient*: Black Draught. *Subsequently* tonic, Potassium Bromide, Strychnine, Gentian, etc. Successful.—A. H. Hare.

As preventive, 1/60 grain Atropine Sulphate *per os*, followed by two 1/120 grain at ½-hour intervals. Also give for treatment.—B.M.J.E. ii./26,75.

A good dose of sea-water is the sailor's remedy for seasickness. Half a tumbler of sea-water from a Winchester labelled 'Mistura Oceani Pacifici' cured all but 4 of 66 men paraded sea-sick on a voyage from New Zealand to S. Africa.—J. S. Purdy, B.M.J. ii./25,628.

Glucose in 3 drachm doses produced an effect superior to that obtained with Atropine, Strychnine, Chloral, Bromides, Alkalies, and the various patent medicines.—G. H. Oriel, L. ii./27,813. *See also ibid.* 1146.

Prophylaxis important. Take two meals a day, breakfast and dinner, for 7 days before, eating meat at one only and avoiding soups and made-up dishes, with bread and an apple at midday: reduce Alcohol, drink water freely and smoke little. The third day before sailing eat nothing but drink water freely. That night and the next take 5-grain Blue Pill and the following mornings Seidlitz powders or salts. Faith essential. A good remedy is 1 minim Tinct. Iod. in a teaspoonful of milk every half-hour and mustard leaf to pit of stomach. Drive patients out of cabins into fresh air. In cases of dangerous exhaustion keep patient in a warm sea-water bath at 90—95° F., bandaging the eyes.—R. A. Bennett, B.M.J. i./28,753.

Sea-sickness and the labyrinthine theory.—T. Gwynne Maitland, B.M.J. i./31,171. See also Capt. Martin Flack, *ibid*, 176, and ketosis in sea-sickness, J. R. Marrack, *ibid*, 178.

Seborrhœa. *Locally.—Formosyl Ointment, Isopropyl Alc. (diltd.), Resorcin Lotion and Ointment, Sulphur and Salicylic Acid Ointments, Thorii Oleat. Ung.*

Chronic seborrhœa capitis in children. After epilation, swab with a 2½ vol. H_2O_2. Mop away, and spray with Cheatle's Malachite Green solution composed of equal parts 2% Malachite Green in 80% Alcohol and 2% Mercuric Chloride in 80% Alcohol. Painful at first, but a valuable aid. Backs of ears, the axillæ, and the groins, should also be sprayed. Protein shock by 0·1 Cc. T.A.B. intravenously on the 19th evening after X-ray epilation, so that the period of fever corresponds to the time of epilation. When the hair falls, change over to Lotio Glycerin. Plumbi Subacet. thrice daily until skin is a natural colour.—W. J. O'Donovan, B.M.J. ii./30,957.

Seborrhœa is common in African natives, though the bald man is seldom seen among them—hence not responsible for baldness. Endocrine metabolism probable cause.—L. i./30,33.

Acidosis and seborrhœa. No evidence to suggest presence of acidosis in seborrhœa.—J. T. Ingram and F. S. Fowweather, B.M.J. i./31,839.

Dandruff to Remove.—Wash the head with soap and spirit and then dry. Rub in well an ointment of Precip. Sulph. 15 gr., Salicylic Acid 15 gr., Soft Paraffin 1 ounce, or if greasy applications disliked a lotion of Salicylic Acid 2 drachms, Castor Oil 3 drachms, Eau-de-Cologne 1 ounce, S.V.R. to 6 ounces. In chronic cases Sulphur Præcip. ½ ounce, Glycerin 2 ounces, water to 4 ounces.

Senescence (Physical Deterioration) and Senility. A paper re work at Chelsea Hospital.—L. i./22,874. *See also* Leonard Williams, L. ii./27,1179.

Septicæmia and Pyæmia.—Acriflavine, Antistrepto. Serum and Vaccine Antistaph. Vaccine, Ferri Perchlor., Gentian Violet inj., Hyd. Perchlor. intrav., Hyd. Benz., Nuclein, Quinine, Resorcin, Salicin, Sulphites, Saline Injection, Sod. Cacodyl, 'S.U.P.' compds., Thyroid and Manganese.

Dakin's Solution must *not* be given intravenously.

Shingles.—*See* **Herpes Zoster.**

Shock, Surgical.—Adrenalin, Brandy hypod., Caffeine Sod. Sal., Calc., Chlorid. Injn., Camph. in Ether, Coramine, Ergot, Ether, Gum Acacia in Saline (or plain), Morphine, Oxygen with Alcohol, Pituitary, Suprarenal, Strychnine. *Intracardiac* injection of Adrenalin Solution 1 Cc.

Sickness.—*See* **Vomiting, also Sea-Sickness.**

Sinuses, Tuberculous.—Iodoform preps., Creosoted Oil.

Skin.—*See* **Eczema, Psoriasis, etc.**

The urine in skin affections is always more acid (pH 4·8 to 5·8) than normal (6.4 to 6.8). Alkalies of value, *e.g.*, Sodium Bicarbonate 30 grains, Potassium Bicarbonate 25 grains, Potassium Citrate 20 grains, Compound Cardamom Tincture 30 m., Peppermint Water to 1 ounce, thrice daily increasing or decreasing to render urine normal.—F. C. Doble, L. i./25,272; *see also ibid.* 407,464,465,516.

Skin affections due to yeast-like fungi (monilia, pityrosporon, blastomyces, coccidioides).—J. M. H. MacLeod, B.M.J. i./30,1119. *See also* Monilia, *Vol. II.*

Skin Disinfection.—*See* **Skin Sterilisation.**

Skin Irritation. *Locally.—Acid. HCN. Dil., Cremor Sicc. preps., Formosyl Cream, Hyd. Perchlor., Lot. Calam., Sodii Carb., Zinc Cream,* see also *Eczema.*

Skin Proliferants.—Allantoin, Acriflavine, Symphytum, Scarlet R.

Skin Sterilisation.—2% *Iodine in* 70% *Alcohol, Mercuric Chloride* 1 *in* 500 *in Spirit, to* 1 *in* 2,000. *Biniodide and Spirit. Eau de Cologne, Metaphen, Perfumed Formosyls, 'Propyl,' Tinct. Iodi.*

Sleepiness.—Tea, coffee, Digitalis, Pituitary or Thyroid suggested.

Sleeping Sickness.—*See* **Trypanosomiasis.**

Sleeplessness.—*See* **Insomnia.**

Small Pox.—*See* **Variola.**

Smell, Loss of Sense of.—Borated Hydrogen Peroxide.

Smoking Habit, Excessive.—*Wash the mouth out with Silver Nitrate,* 1 *in* 250. *Anti-smoking gum, Formosyl Pastils.*

Snake-bite. ***First Aid.***—Apply tourniquet a few inches above bite and then give immediate subcutaneous injection of Antivenene supplemented by incision and suction if the bite has been inflicted by a large snake and symptoms are severe. Repeat every half hour.—L. ii./29,1102.

Alcohol and Ammonia, Antivenom Serum, Pot. Permang., Strychnine inj., Calcii Chlorid. inj., Tinct. Ammon. Co., Mist. Olea-Balsamica.

Locally.—Chloroform, Chloral cum Camphora, Cocainæ Hydroch. Liquor, Hydrogen Peroxide.

Spray the part with Ethyl Chloride, whilst making incisions and rubbing in Potass. Permang. Gelatin Inj. for hæmorrhage.

Cocaine Hydrochlor. injected in full doses at the site of puncture caused by fangs of the snake not only relieves the pain, but causes reduction of the swelling if promptly used. Well combined with *permanganate.* Oozing hæmorrhage is reduced by taking large quantities of *gelatin* solution 5%, *per os.*—J. C. Fox. *See also* **Bites.**

Snake bite in India. Single serum impracticable.—H. Harcourt, B.M.J. i./31,252.

Sneezing, Spasmodic.—Calcii Chlorid *q.v.*

Spasm.—Æther, Ammon. Arom. Spt., Amyl Nitris, Atrop. inj., Belladonna, Benzyl Benzoate, Cajuput Ol., Camphora, Chlorof. and inhaled, Chloromorphiæ Liq., Erythrol Nitrate Tablets, Ext. Grindeliæ Liq. (of larynx). Mannitol Nitrate Tablets, Menth. Pip. Ol., Mistura Ætheris cum Ammonia, Opium, Papaverine (Gastric and Intestinal), Piscidia.

Spasmophilia.—In infantile tetany large doses are given. Also Ac. HCl. and Ammon. Chlor.

Speech Fright.—*See* **Stage Fright,** also **Nervousness.**

Spermatorrhœa.—*See* **Incontinence of Semen.**

Spina Bifida.—Iodo-Glycerin injection. Iodine Liniment.

Sporotrichosis.—Potass. Iodid.

Sprains. *Locally.—Arnica, Fomentations (hot) of Poppy-head or Belladonna, or cold with vinegar, or spirit lotions, Lead and Opium Lotion, Lotio Ammonii Chloridi.* When chronic, *Liniments of Belladonna, Chloroform, Camph. Co., Lin. Tereb. Acet., Radiant Heat, 'X' Rays.*

Spring Catarrh.—*See* Catarrh. Nasal and Hay Fever.

Sprue.—Calcium and Parathyroid (Harold Scott), Castor Oil, Cyllin, Koumiss, Milk Diet, Pancreas Fresh, Pepsin, Santonin, Sys Powder, Trilactine-Milk and Tablets after Milk meal.

Sodium Bicarbonate 10 to 20 ounces of 2 to 4% solution intravenously slowly in addition to *per os* doses.—A. Castellani, B.M.J. i./21,338.

Hydrochloric Acid, 15 minims of 0·2%, before, and 10 grains of Pancreatin after each meal, no dietary precautions being taken whatever. This treatment has been adopted along the entire coast of Queensland.—S. M. Lambert, per Jl. Trop. Med., Oct. 15/23,323. See also T. R. Brown, *ibid.*, Oct. 16/22,330.

Tropical sprue, closely related to pernicious anæmia, is a deficiency disease in which well-chosen food is of great value.—C. Elders, L. i./25,75.

Colonic lavage with Dimol Solution.

Sprue treated by high protein diet by N. H. Fairley, also by Calcium Chloride 2% solution intravenously ; dose 1 Cc. increased to 3 Cc.—W. Gover, B.M.J. ii./30,61. Calcium Chloride 10% 4 Cc. dangerous intravenously.—W. D. M. Lloyd, B.M.J. i./28,662.

Stage Fright.—Cannabis with Laudanum. Gelsemium (*q.v.*), Laudanum, Opium Pills, Opium with strong coffee (Morell Mackenzie), also with Sal Volatile and Camphor Water. Three deep inspirations valuable.

Stenosis of Pylorus; Urethra, etc.—Cicatricine, Opii. Tinct. *q.v.*

Sterility.—Ovarian Gland Sicc., Testicular Gland Sicc., Corpus luteum.

Stings.—*See* **Bites.**

Stomach Dilatation.—Sodium Phosphate as nervine tonic. As antiseptics, to overcome fermentation—Bismuth Salicylate, Salol, Betol, Benzonaphthol, Eff. Sod. Mag. Aper., Trilactine Milk. See also GASTRIC SECRETION.

Stomatitis.—Hydrastis, Laudanum, Pot. Chloras, Sod. Hyposulph., Sodii Bisulphis, Sodii Chloras.

Locally.—Acid. Boric., Acid. Carbolic, Acid. Picric as paste (stomatitis mercurialis), Acid. Salicylic, Acid. Sulphuros, Alumen, Borax, Glyc. and Mel., Calcis Aqua, Collutorium Hydrog. Perox., Cupri Sulph., Formosyl Mouth Wash, Hydr. Perchlor. Lotion 1 *in* 5,000, *Iodine Colloidal, Liq. Alum. Aceto Tart. as mouthwash, Myrrhæ et Boracis Tinct., Perfumed Formosyls (diluted), Salol Mouth Wash, Sodii Chloras, Potass. Chloras.—See* **Pastils.**

Stomatitis Gonococcal—Eyes with 1 in 5,000 Hyd. Oxycy. Wash. Urethra and Mouth—1 in 8,000 Permanganate.

Strictures.—Cicatricine, Radium (œsophageal), Ung. Thiosinamin.

Styes.—Copper Point or Copper Sulphate Solution.

Yeast tablets, combined with hot Boracic fomentations at night, frequent daily bathings with Boracic Lotion, and incision of stye if matter forms, should effect cure.—S. Tibbles, B.M.J. ii./29,36.

Styptics.—*See* **Hæmorrhage.**

Sunburn and Freckles. *Locally.—Æsculin Unat.* 2% *in Vaseline, Hazel Foam, Boric Acid Lotion, Corrosive Sublimate Lotion, Lactic Acid Lotion, Cucumber Ointment, Formosyl (diluted), Mistura Amygdalæ, Thorii Oleat. Ung. diluted to a cream, Ung. Plumbi Carbonatis.*

Sunburn.—Quinine the most effective protecting substance. The following pleasant to use: Quinine Bi-hydrochloride 5, *Water sufficient quantity to solve, Anhydrous Lanolin* 40, *Lavender Oil* 1, *Soft Paraffin to* 100.

As preventive: Acid Tannic 10, *Spirit* 25, *Water to* 100. *Apply freely to exposed parts of the skin before going out of doors.—H. W. Barber.*

Sunstroke.—Ammon. Carb., Apomorphina, Atropine, Bromides, Digitalis, Ergot, Hyoscina, Morphinæ inj., Quinine, Sedasprin, Veratrum.

Purgative enemata, Sinapis Emplastrum.

Sunstroke in the Tropics cured by Pilocarpine hypodermically with 1 or 2 minims of Croton Oil.—J. McOscar, B.M.J. ii./23,310.

Suppuration.—Staphylo Vaccine. *Locally.*—Wound remedies, *q.v.*

Sweats.—*See* **Night Sweats.**

Sweating Feet.—Alum Acet., Formalin, Formosyl, Pulv. Salicyl. cum Talco.

Sycosis. *Locally.—Arsenobenzol, Bismuth Oleas, Ichthyol, Liq. Hydrarg. Perchlor., Hydrog. Perox.* (1 *to* 2 *vol.*), *Iodides externally, Ol., Tereb. in Oil Injectio, Manganese Butyrate, Uranii Oleas, Sulphur, Ung. Cupri Oleat* 10%, *Ung. Hyd. Ammon., Ung. Hydrarg. Nit., Ung. Hydrarg. Sulph. Flav., Ung. Thorii Oleat., 'X' Rays.*

Synovitis.—Ext. Solani Liq. has been advised, Mercurials.

Syphilis.—Antim. Sodii Tart., Arsamin and other Organic Arsenic Comps., Arsenobenzol alone and with Mercury and Injection of Patient's serum after, Auri Chlor., Barii Chlorid., Bismuth Subnit. Injection, Bismutol and other Bi. Preps. (*watch mouth*), Calc. Iodo-ricinol., Ferri Iodid. Syrup, Hyd. c. Creta, Hyd. Cyanid., Hyd. et Pot. Iodid., Injectio Hydrarg. Intram. and other Mercurials, Iodinol, Iodoprotein, Iodum, Iodine Colloidal, Mercurialised Serum, Mang. Butyrate, Metaphen, Mist. Quin. c. Ferro, Mist. Hyd. Perchlor. Co., Myosalvarsan, N.A.B. (and Guaiacol Glucose Sterules for dissolving). Pot. Iodid. Pil. Quin., Hyd. et Opii, Protargol, Quin. Hydrochlor., Quin. Hydrochlor-Carbamid. and Hydr. Perchlor., Quin. Iodo-bismuthate, Quin. Nucleinas, Quin. Periodide, Salicin, Sarsaparilla preps., Sod. Iodid., Syr. Ac. Hydriodici, Tiodine.

For Methods of Diagnosis.—See Vol. II.

Locally.—Arsamin Paste, Hydrarg. Lanolin., Hyd. Oleat et c. Morphina, Hydrarg. Ung., Iontophoresis of Potass. Iod. Solutions. Ung. Prophylaxis.

Organic gastric syphilis. Neokharsivan, Potassium Iodide, and Mercury inunctions.—D. Smith, B.M.J. ii./30,773.

Syphilitic Sore Throat.—*Locally.—Alum Garg., Borax Garg., Chlorine Garg., Colloid Silver, Collutorium Hydrog. Perox., Hyd. Cy. Garg., Hyd. Perchlor. Garg. and Pastil., Pot. Chlorat. Garg. Pastil. and Troch.*

Syphilitic Ulcers.—*Acid. Chromic, Acid Pyrogallic, Arsamin, other Org. Ars. Comps., Collod. Salicyl. c. Hyd. Perchlor., Dusting Powder of Calomel and Bismuth, Hyd. Acid. Nit. Liq., Hyd. Flava and Nig. Lotio, Hyd. Iodas., Hydr. Naphthol, Hyd. Oleat. Morph. etc., Hyd. Subchlor., Collod. Iodof., Iodof. Wool, Ung. Resorcin, Zinci Chlorid. Iodid. and Nitras, Ung. Antimonii, Ung. Arsenii, Anserin, Ung. Iodi Intinct.* Internal Remedies, see Syphilis.

Tabes Dorsalis.—*See* **Locomotor Ataxy.**

Tachycardia.—Amyl Nitrite, Atropine, Cactus, Digitalin, Nitroglycerin, Parathyroid, Sparteine, Strychnine.

Tænia.—*See* **Worms.**

Tartar on Teeth, to dissolve.—*Lotio Acidi Citrici et Phenolis*

Tattoo Marks, to remove.—*Acid. Salicylic, Tannin and Silver Nitrate. —Ac. Nitric. (Ph. Form.), Glycerin Papain* (?), *Iontophoresis.*

Refs. to Briault's work.—P.J. ii./12,557, see also C.D. ii./12,272.

Tetanus.—Anæsthetics (to relax spasms), ***Antitoxin,*** Amyl Nitris (checks spasm of glottis and resp. muscles), Bromides, Cannabis, Chloral Hydras, Curara, Luminal-Sodium Inj., N. Saline Injections, Paraldehyde intrav., Parathyroid, Physostigmine, Sodium Persulphate.

Oxidising Antiseptics.—H_2O_2, Permanganate, Chlorine and Iodine are adverse to B. Tetani (use latter locally), but Phenol and Magnes. Sulph. have no apparent effect.

Curare (*q.v.*) cured after Tetanus Antitoxin failed.

No limit to the total amount of serum that can be given. Chloretone in 20 grain doses three or four-hourly best for painful spasms.—C. Worster-Drought, L. i./26,726.

Tetany.—Parathyroid. Some good results have been reported.—Prof. Swale Vincent. L. i./23,130. Large doses of Calcium Lactate in conjunction. —Dan T. Davies, B.M.J. i./23,512. Stront. Lactate, Ol. Morrhuæ.

In infantile tetany Calc. Chloride, Ac. Hydrochlor. or Ammon. Chlor—*q.v.* Dan T. Davies, L. i./30,202.

Thirst, to Relieve.—Acid. Citric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Acid. Tartaric., Coca, Formalin Tablets (Internal), Haust. Imperialis, Mucin, Pot. Chlor. Tablets, Pot. Cit., Pot. Tart. Acid.

Thrombosis, Coronary.—Give Morphine freely ¼ to ½ grain subcutaneously or intravenously, then Tincture of Digitalis in 20 minim doses every 6 hours up to 2 drachms (with care). Later give Theobromine Sodium Salicylate 15 grains thrice daily.—G. S. Haynes, Pr., Sept.'31,379.

Throat, Inflammation of, and Tonsilitis.—Aconit. Tinct. and Pastil, Aspirin, Ammon. Brom., Antimony, Belladonna, Broadbent's Mixture, Calc. Sulphide, Elix. Sod. Lact., prior to operation, Fe. Salicyl., Formalin Tablets (Internal), Guaiacol, Lichenoids, Liq. Ferri Perchlor., Phenazone, Quinine HCl. Acid. as spray or paint, Quininæ Salicylas, Salicylates, Sodii Benzoas, Sodii Bicarb., Solubes (various), see Index, Strepto. or other Vaccine, Tab. Formalin (to suck), Tylcalsin, Tyllithin.

Locally.—Adrenalin Spray, Benzoin Tinct. Vap., Chlorates in Troch., Cocaine (Pigment of), Colloidal Argent and Hydrarg., Guaiaci Troch., Iodi Vapor, Monsel's Sol., Sod. Perbor., Thymaglycine.

Throat, Relaxed Sore.—Ac. Carbol. Pastil., Ac. Tannic Glycerin, Alum and Glyc. Aluminis, Alum Aceto-Tart. Liq. and Alum Format. Liq., Ammon. Chlorid Vapor, Argent. Nit., Benzoin Tinct. Vap., Bism. Past., Elixir Guaiaci, Ferri Perchlor. Pig., Guaiaci Troch., Hydrastis Tinct., Iodine Colloidal, Lichenoids, Phenoloid Tablets, Pini Sylvest. Vapor, Solubes (various), see Index.

FOLLICULAR TONSILITIS.—Eusol. Calcium Sulphide said to be specific.

Thrush (Aphthæ).—Bismuth preparations, Gentian Violet, Iodine Colloidal, Iodoform, Mineral Acids, Quinine preps., Sod. Bisulphis, Sodii Chloras, Sodii Sulphis. Tab. Formalin to suck.

Locally.—Acid. Boric, Acid. Sulphuros, Alumen, Borax, and Glyc. of, Dakin's Solution, Formaldehyde Pigment, Iodol, Lotio Nigra et Glycerini, part. æq., Potass. Permang., Sodii Chlorinat. Liquor.

Thrush treated by swabbing with Gentian Violet solution 1%.—per Pr., Dec., '27,393.

Tic Douloureux.—*See* **Neuralgia.**

Tinea Favosa and Sycosis. *Locally.—Ac. Carbol. Glyc., Ac. Salicyl. Ung.* (50%), *Acid Sulphuros, Croton Oil, Chrysarobinum, Cupri Oleat. Ung., Ethyl Chloride, Formaldehyde, Hyd. Oleat., Hyd. Iodas, Hyd. Perch. Lotio., Hyd. Perox., Iodi Linim, Petroleum of Commerce, Picrotoxin Pigment, Pig. Acid Picric et Camph., Pyrogallol, Resorcin, Sodii Chloridi Ung., Sod. Hyposulph. Lotio, 'X' Rays, Copper Ionised.*

Apply *Whitfield's Ointment* or first mop with Tincture of Iodine, then rub on Silver Nitrate 1, dissolved in Spirit Nitrous Ether 50. Repeat and apply the ointment between whiles.—H. G. Adamson.

Tinea Tarsi.—*See* **Ophthalmia Tarsi.**

Tinea Tonsurans and Circinata.

Locally.—As for **T. Favosa** and—*Colloidal Ag. and Hg., Cupri Oleas, Ferri Perchlor. Liq., Formosyl, Hydrarg. Nit. Acid. Ung., Iodi et Olei Picis Pigment, Iodised Phenol, Izal, Sphagnol, Salicylic Acid, Sodii Carb. Cryst. melted hot, Sulphur, Ung. Hyd. Iodid. Rub., Ung. Potass. Sulphurat., Ung. Sodii Chloridi, Ung. Sulph., Naphthol Salicylat., Ung. Thorii Oleat., 'X' Rays.*

Suppurative trichophytosis cured by Gram's Solution, 5 Cc. intrav. diluted with 20 Cc. of artificial serum: 2 injections given at interval of 8 days.—B.M.J.E. i./24,10.

Adamson's Ointment consists of equal parts of Sodium Chloride and Vaseline, and is used after epilation for producing a superficial folliculitis and for bringing out the stumps.—L. ii./27,553.

Tinea Versicolor.—*Acid. Chrysophanic., Acid Sulphuros., Borac. Glycerin, Colloidal Ag. and Hg., Formaldehyde, Lotio Calcii Sulph., Sodii Hyposulph.Lotio.*

For various forms of tinea the following lotion is recommended. Resorcin 2 drachms, Tincture of Benz. Co. to 1 ounce.—A. Castellani, L. i./20,943.

Ringworm of nails treated by solution of Acid Salicylic 1 drachm in 1½ ozs. Methylated Spirit painted on after scraping every night and without scraping every morning; use three months or longer.—R. Craik, B.M.J. i./20,185.

Epidermophytosis or eczematoid ringworm well treated by swabbings with 1 in 1,000 or even 1 in 5,000 solution of Potassium Permanganate.—L. ii./22,578.

Tinea cruris.—*Ung. Chrysarobin B.P.* will effect a cure in six days if applied thickly on lint twice daily. Salicylic Ointment takes longer. Salicylic Collodion useful for small or scattered lesions.—L. ii./22,791.

Ringworm of feet and hands.—Ung. Ac. Salicyl, Mycozol.

Wood's Glass in diagnosis of ringworm. Fluorescence of hairs infected by ringworm in light filtered through glass containing Nickel.—J. Kinnear, B.M.J. i./31,791.

Tinnitus Aurium.—Brominol, Iodinol, Pilocarpine Injection.

Inflation of warm air, vapour of Chloroform or Ether or a few drops of 5% Methyl Salicylate in Parolein through a catheter.—L. i./26,150.

Digitalis in the pulsating form, Bromide (useful at bedtime and often gives great relief), hypnotics, sedatives, Paraldehyde, Potass. Iodide (where associated with vertigo), Pilocarpine (in cases showing Menière's symptoms).

Thiosinamin (hypod.) *Iodum Oleatum.*

Toenail, Ingrowing.—*Lead Nitrate as dusting powder.*

Tonics.—*See* **Anæmia, Debility, Fevers, Rickets, etc.**

Tonsillitis.—*See* **Throat and Pharyngitis.**

Chronic tonsillitis treatment. Indications for enucleation.—J. S. Fraser, L. i./26,408.

Tonsillomycosis.—Local application of Glycerin Borax, Carbolic Lotion 1 in 20, or dilute Tinct. Iodi Mit. 1 in 2; internally, Salicylates, Aspirin, Pyramidon or Potassium Iodide.—Sir A. Castellani, Jl. Trop. Med., Aug. 15,31, 275.

Instead of tonsillectomy.—London Paste.

Toothache.—Atropine Methyl Bromide with Aspirin, Pil. Butyl-Chloral Hyd. c. Gelsem., Gelsem. Tinct., Magisal, Piscidiæ Ext. Fluid., Quin. Tinct. Ammon., Sedasprin.

Locally.—Acid. Arsenios., Acid. Carbol. c. Collodion, Benzyl Alc., Butyl-Chloral c. Menthol, Caryoph. Ol., Chlorof. c. Camph., Chlorof. c. Mastic, Cocainæ, Cocaine-Menthol-Eugenol, Cocaine-Menthol-Phenol, Creosotum, Eugenol, Iod. et Aconiti Tinct., Liq. Sodii Carbol., Menth. Pip. Ol., Opii Tinct., Pasta Arsenicalis, Pot. Permang., Pyrethri Tinct., Res. Carbolica, Sod. Peroxidum.

Toothache Remedy.—N. F. 5th Edn. 1926, consists of Cinnamon Oil 10, Phenol 20 and Methyl Salicylate 30.

Toxæmia.—Anti-Gas-Gangrene Serum (of acute intestinal obstruction intrav. dose 10 to 25 Cc.), Calc. Chlor. intram., Digitalis, Ether, Purgatives, Diuretics, Jaborandi, Sal Volatile, Stimulants, Strychnine.

Toxæmia, Alimentary.—Acid HCl., Emulsio Paraff. et Bismuth, Glucose injections, Kaolin, Charcoal, Liq. Chlori, Trilactine.

Trachoma.—Abrus. Preps.—Radium Rays—good results. Acid Carbonic Snow, Copper Sulphate (and Ionisation of), Silver Salts. *See also* Cancer.

In the first stage Silver Nitrate solution 10 grains per ounce, or Copper Sulphate applied as stick, to the conjunctiva. Balloon the fornix with sub-conjunctival injection of Saline, including 4 minims of 4% Cocaine and 4 minims of Adrenalin Solution. Treatment of complications such as trichiasis and pannus, the latter occasionally by peritomy and corneal ulceration by use of Scarlet 2% in Olive Oil are called for later. *Dionine* for promoting absorption of corneal opacities and installation of 5% infusion of crushed Jequirity Seeds are of value. Secondary infection is combated with Zinc Sulphate and Silver Nitrate drops. In gonococcal and streptococcal infections eye baths of Saturated Magnesium Sulphate Solution are useful.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304.

The disease is divisible into four stages, each type requiring special care with caustics—Perchloride, Silver Nitrate, etc.—A. F. MacCallan, L. ii./26,919.

Review of recent claims for various drugs—Chaulmoogra Oil rubbed into conjunctiva by a glass rod—Olive Oil massage. Painting with Copper Sulphate as satisfactory as any.—W. S. Duke-Elder, M.A. '31,110.

Trichinosis.—Ergota, Ergotin, Liquor Arsenicalis.

Combat gastro-intestinal symptoms and fever with Bismuth, Salicylates and Quinine. Later, Dimol, when true nature of disease found. Antimony Tartrate, intravenously, possibly of use.—D. A. Rice, L. ii./22,799.

Trypanosomiasis and Tick Fever.—Mist. Antim. et Pot. Iod., Methylene Blue.

Locally.—Arsenic (Sodium Arsenate), Arsamin and other org. arsenic comps. q.v., Antim. Oxid. Inj., Antim. Sodii Tart., Auramine (?), *Fourneau* '309,' *Bayer* '205,' *Novarsenobenzol and injection of patient's serum treated with.*

Tuberculosis, Laryngeal.—*Ac. Lactic Spray or Pigment, Ac. Picric Inhalation, Boric Acid Insufflated, Cocaine (Lozenges and Spray), Eusol, Guttæ Cinnam. Co., Iodoform, Iodine Inhal., Menthol in Olive Oil, Morphine, Pastils of Cubebs, Pot. Chlorate or Ipecac., Silver Nitrate Spray, Tuberculins, Vapor Creosot Co., Vap. Ol. Pini Sylv.*

Important to clear the nose of catarrhal and purulent secretions. Wash out nose with Sodium Salicylate and Sodium Chloride of each 48 grains, Sodium Biborate 96 grains, Glycerin 82 minims, Menthol Water (1 in 1000) to 2 ounces—a teaspoonful in an ounce of warm water.—Sir James Dundas Grant, Pr. Aug. '31,257.

Tuberculosis, Renal.—Mild 'cystitis' cases should be regarded with suspicion. Surgical methods.—C. A. R. Nitch, L. i./25,1,34.

Tuberculosis.—*See* **Phthisis.**

Typhoid Fever.—Barii Chlorid., Carbo Anim., Cinnamon Oil, Carbolic Acid, Cinchona Alks., Charkaolin Granules, Emetine Hyp., Guaiacol, Hyd. Subchlor., and Perchlor., Hydrog. Peroxide, Iodates, Iodine Tinct., and Phenol dil. to drink, Magnesii Salicylas, Mist. Chlori c. Quin., Naphthalene, Naphthol (*a*), Olive Oil, Phenyl-Aspriodine, Platinum Coll., Salol, Santonin, Sodii Acid. Sulph. as water disinfectant, Sodii Chloras, Soda Chlorinata, Sod. Nucleinate Inj., Sulphur, Sulphurous Acid, Thymol, Vaccines and Sensitised Vaccines, (T.A.B.), also Multiple Vaccines (Castellani), Trilactine Milk, Turpentine Oil (per rectum).

Hæmorrhage, Intestinal from: Calcium Chloride, Crocq's Pill, Argenti Nitras, Ergot, Pil. Plumbi Acetatis cum Opio, Turpentine, Hæmoplastin.

Locally.—Allantoin, Alcohol Compresses, Colloidal Ag. and Hg., Hyd. Per. chlor. intrav. Glucose feeding per rectum, see also Enemata.

Enteric fever in 1929-1930. High death-rate.—B.M.J. i./31,808.

Typhoid treatment. Disinfection of excreta with equal volume of 1 in 20 Carbolic. Washing of patient. Cradle if temperature rises above 103° F. Before discharge, stools and urine to be examined three times at 5-day intervals. Carrier treatment unsatisfactory. A resumé of necessary attention to the bowels. For distension Carbohydrates cut down. When colon is mainly affected Tinct. Asafetida 2 drachms in Starch Mucilage 4 ounces per rectum. Other treatments: Emuls. Ol. Tereb., Capsules 5 minims of Oil of Cinnamon,

Collosol Kaolin 3 drachms in Water 4 ounces; Eserine 1/200 grain with Strychnine 1/60 grain may be needed or Pituitrin ½ Cc.—A. E. Gow, L. i./30,37,96. Orange Juice has been advised.

Heart Failure in.—Caffein Sod. Benz., Camphor, *e.g.*, Curschmann's Solution.

Venous Thrombosis in—intravenously 0·5% Sodium Citrate up to ½ pint.

Typhus.—Sod. Salicyl intrav. See also Vol. II.

Ulcers.—*The following are chiefly for local use: see text. Ac. Boric., Ac. Carbolic., Ac. Chromic., Ac. Lactic, Ac. Salicyl., Alii Succus, Allantoin, Argent. Nit., Bism. Oxyiodid., Borated Hydrogen Perox., Brilliant Green, Calc. Sulphide. Stearettes, Carbo., Colloidal Metals, Cupri Acet., Cupri Oleat. Ung., Elix. Calc. Iodid., Eusol, Formosyl, Glyc. Bellad., Hamamelis, Horse Serum, Hydrogen Peroxid., Iodates, Iodoform, Iodol, Methysal Balm, Naphthalin, Nuclein Inj., Oxygen, Unna's Paste, Pasta Amyli Iodid., Paste Carbonis et Zinci, Parathyroid, Paraffin No. 7, Plumbi Subacet. Glyc. and Ung., Pot. Biborate Solution, Pot. Permang., Radium, Resin Ung. and Res. Ung. c. Chlorof., Resorcin, Salol, Sanitas, Scarlet 'R,' Sod Cit. locally to soften, Sphagnum, Strepto. Vaccine, Toluol, Trilactine, Ung. Pheno-Boric., Ung. Pot. Chlorat. et Zinci, Ung. Thorii Oleat., Zinci Chlorid., Zinci Oleat. Ung., Zinc Perox., Zinci Sulph. Solube as Lotio, Zinc and other Ions, Pot. Biborate Solution.*

Tropical ulcers well treated as follows:—Daily bath for 1 hour with Mercuric Chloride 1 in 2,000, followed by Boric fomentations every 4 hours; the following ointment then applied—Zinc Oxide, Salicylic Acid, Ammoniated Mercury Ointment, Vaseline, equal parts. Put on ½ inch thick and leave for 3 days without dressing. Leg should be rested. Rapid improvement.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,38.

Natural healing of ulcers. Too many fomentations—dry dressings better.—N. H. Joy, B.M.J. i./31,80.

Ulcer, Duodenal.—Cocaine Period., Mist. Bismuthi Phenolis et Morphinæ, Kaolin for lubricant effect. Pulv. Bismuth Co., MacLean. Succus Allii diluted with three times quantity of water.

To counteract constipation resulting from Bismuth give Pil. Hyd. Subchlor., Rhei, Cascaræ et Capsicin. When active symptoms subsided a tonic of Papain 2 grains, Phenol 2 grains, Strychnine $\frac{1}{30}$ grain, Codeine ¼ grain, Rhubarb Ext. ¾ grain.—Guthrie Rankin, B.M.J. ii./10,181.

Ulcer, Gastric.—Aperfine, Argenti Nit., Ferri Perchlor., Gelatin, Glucose, Inf. Symphyti, Kaolin for lubricant action, Mist. Bismuth, Phenol et Morph., Pulv. Bismuth Co., MacLean, Horse Serum, N. Saline Inj., Ol. Olivæ.

Sod. Cit., Calc. Phosph. Tribasic, Mag. Phosph. Tribasic, Sippy's Powder.

(1) promote healing by nourishing food; (2) "fix" the gastric acid and so prevent it from interfering with healing by ensuring that the food contains a large proportion of protein; (3) prevent distension of the stomach by small feeds. Milk and egg diet supplemented by Iron and Bismuth. Pain disappears early, vomiting quickly subsides and relapses are rare.—Hutchison.

Diagnosis.—*See* Stomach Contents Examination.

Toxic symptoms from very large doses of alkalis in peptic ulcer.—A. F. Hurst, L. i./23,1288.

Peptic ulcer—ætiology of. Various stages of acute ulcers produced by Histamine injections. It may be a factor in producing it clinically.—L. O'Shaughnessy, L. i./31,177.

Gastric and duodenal ulcer. Good immediate medical results by means of rest in bed, milk diet and alkalization.—A. Rendle Short, B.M.J. i./31,435.

Undulant Fever.—Trypaflavine, see also Mediterranean Fever.

Uræmia.—Aconite, Atropine, Bromides, Caffeine, Cannabis, Digitalis, Elaterin Pulv. Co., Erythrol Nitrate, Hyd. Subchlor., Lithii Hippuras, Nitroglycerin, Papaverine, Parathyroid, Pilocarpine, Saline Purgatives, Saline Solution, Scilla, Sodii Benzoas, Strophanthus, Venesection.

Uræmia and Albuminuria treated by 1 Cc. of 1% *Pot. Permang.* hypod. Almost complete suppression of urine reacted to 10 drops of ½% solution. Some local pain at site of injection, but this is relieved by hot fomentation.—F. V. Davison, L. i./16,430.

Treatment of uremia. 5% Glucose given to a patient with a large white kidney and considerable œdema—patient much brighter. Query as to efficacy of Calcium Lactate and alkalis.—Prof. F. G. Langmead, L. i./30,407. Suggestion to give 6% or 7% Glucose. Parathormone in large doses diminished

œdema.—E. P. Poulton, *ibid.* Large doses of alkali effective.—A. A. Osman, *ibid.* Caffeine Sodium Salicylate in 2 grain doses valuable in promoting excretion of the kidney.—Sir W. Willcox, *ibid.*

Diagnosis.—Blood urea estimation of value in combination with clinical signs.—A. A. Osman and H. G. Close, B.M.J. i./31,1065.

Uræmic Convulsions.—Bromides, Chloral (per os or per rectum), Chloroform, Jaborandi, Morphine, Saline Solution, venesection or catharsis, may prolong life.

Urethritis. *Locally.—Argent. Nit.* (0·02 *to* 0·1%) *Irrigation or combined with Hydrogen Peroxide* (1 *to* 2 *volume*) ; *Glyc. Resorcin, Mang. Butyrate* (*Inj.*), *Mercurome, Santalol* (*per os*), *Turpentine by catheter. See also* GONORRHŒA.

Uric Acid Diathesis.—*See* **Gout, Rheumatism.**

Urinary Calculi.—*See* **Calculi.**

Urine, To render Acid.—Aspriodine, Benzoic Acid, Sod. Phosph. Acid (the natural acid of the urine), Salicylic Acid (increases acidity slightly). Large doses of Citric or Tartaric Acid.

Urine, to render Alkaline.—Potassium, Sodium, Lithium, Calcium Tartrates, Citrates and Carbonates.

Post-operative urinary retention treated by emptying the bladder by catheter and giving injection of Glycerin 50 Gm., Boric Acid 5 Gm., Sterilised Water 5 Cc. Micturition established in 15 to 30 minutes. Only one failure in 175 cases.—B.M.J.E. i./26,20.

Urine, Blood in.—Ammon. Chlor., Calc. Lactas : Iron Salts.

Urine, Incontinence of.—*See* **Incontinence.**

Urine, Retention of.—Hexamine intravenously. Glucose intrav. feeding *Post-operative Retention of Urine.*—Pilocarpine *intrav.* 1/8 grain, or *per rectum* ½ grain, often successful where Urotropine fails.—per M.A., 1931,10. Brief experience favourable.—A. R. Short, *ibid.*

Urine, Tests for Albumin, Sugar, etc.—See Vol. II.

Urinary Antiseptics.—*See* **Antiseptics, Urinary.**

Urticaria.—(For Diagnosis, Protein Skin Tests). Bromides, Calcii Lactas, Cream of Tartar, Elix. Sod. Lact., Ephedrine, Ergotamine Tart., Magnesia Cream, Manganese Butyrate, Milk and Glycerophosph., Mist. Alba, Peptone Inj., Pituitary, Sodii Bicarb., Sulphur (Stearettes), Terebene, Trilactine. Desensitisation.—J. T. Ingram, L. ii./31,128.

Locally.—Acid. Benzoic, Boric., Carbolic Lotio, Hydrocyan. Dil., Chloroform, Cremor Sicc. Preps., Liq. Hamam., Ung. Cocain., Perfumed Formosyls, Plumbi cum Lacte Lotio, Sodii Carb., Balnea, Zinc and Starch Powder.

Uterus, Catarrh of.—*See* **Catarrh, Uterine.**

Uterus, To promote Contraction of.—Cimicifuga, Cornutine, Ergot Preps., Gossypii Rad. Cortex, Hamamelis, Hydrastis, Pituitary Ext. Liq. (Posterior lobe), Saccharum.

If *malaria* be diagnosed in pregnancy give Quinine or Quinidine at once—divide dosage into 2½ or 5 grain doses every 2 or 4 hours.—See p. 742.

Uvula, Relaxed.—*Locally.—Gargles of Alum, Catechu, Ferric Chloride, Kino, Pigment of Glyc. Tannin, Pot. Chloras, Rhatany, Kino or Tannin Lozenges, Zinc Sulph. or Zinc Chlor. Gargle and Pigment.*

Vaginitis.—*Ovules var.* (*q.v.*), *Argent. Proteinas, Formalin Dil.* (*q.v.*), *Pess. Ac. Lactic., B. Ac. Lactic Paste in milk freshly made and smeared on, Thymaglycine diluted.*

Varicella.

Chicken pox is air borne. It may uncommonly be conveyed by air on the third day, but apparently not afterwards. See Table of Diseases.

Vesicles should be painted with Iodine from the first ; prevents scarring.

Varicose Ulcers.—Calcii Chlorid., Calcii Iodid., Parathyroid Gland.

Locally.—Allantoin, Flavine, Silver Chloride suspension. See also ULCERS.

Unna's Paste over layers of gauze after packing with Zinc Ointment. A bandage is wound round and at each turn it is painted with Unna's Paste. If possible allowed on for a week—repeat later.—J. Devane, L. ii./27,865.

Unna's Paste has been modified for treatment.

Hunt's bandage method for varicose ulceration. The surrounding tissue is protected with vaseline and the ulcer covered with strips of g. p. tissue. Non-absorbent wool completes the dressing.—B.M.J. i./31,124.

Indolent ulcers treated with elastic bandage and injection. Vicious circle converted into a ' one-way street.'—D. Wright, B.M.J. i./31,399.

Aspirin Powder sprinkled on floor of ulcer analgesic—effect lasts 4 to 7 days. —A. D. Wright, L. ii./31,913.

Varicose Veins.—Tinct. Nucis Vom., Tinct. Hamamelis in Spt., Iodine Injection (Schiassi's Method). Ext. Hamam. Liq. lightly applied. Unna's Paste modified on bdge.

Quinine and *Urethane* intrav., *Sodium Morrhuate, Sodium Salicylate* injections (Sicard and Paraf), also *Lithium Salicylate* and *Tutocaine.*

Glucose, 3 Cc. of a 66% solution ; ½ Cc. Glycerin of Phenol ; as also Iodine have also been used with good results.—A. H. Douthwaite, B.M.J. ii./26,554, and a brochure 1927 (H. K. Lewis). Elastoplast Bdges., p. 267.

Variola.—Hydrarg. cum Creta (*q.v.*) 10 grains *ter die*, appears to abort.

Variola, To prevent pitting.—*Acid. Boric. Ung., Acid. Carbolic Ol., Argent. Nit., Calcis Linim., Collodium, Hydrarg. Ung., Iodine Dilute, Phenol pure, Styptic Colloid., Zinci Oleat. Ung.*

Pot. Permang. (*q.v.*) *Bath* 5% *or less. Izal Dilution, Bath of.*

Vasodilators.—Acetylcholine, Amyl Nitrite Sterules, Benzoates, Erythrol Nitrate, Hippurates, Mannitol Nitrate Tablets, Nitroglycerin Tablets, Sodium Nitrite, Spirit of Nitrous Ether, Thyroid Extract.

Venereal Diseases.—*See* **Syphilis, Gonorrhœa, Chancroid.**

Vermicides.—*See* **Parasites** and **Worms.**

Vertigo.—Acid. Hydrobromic (with a little Quinine), Adrenalin *per os* Ammon. Spt. Arom., Aspriodine, Nitroglycerin Tablets, Caffeine, Guarana, Quininæ Valerian, Strychnine, Zinci Valer.

Small doses of Mercuric Chloride are recommended by Sir J. Dundas Grant. —Pr., Aug., '27,99.

Vincent's Angina.

Vincent's spirochætæ and Fusiform Bacilli—infection of mouth, eyes and penis. Mixture of Arsenic and Ipecac. as also the *Pigmentum Ipecacuanhæ et Arsenici* (*q.v.*) applied to the mouth, cleared up the condition.—F. B. Bowman, L. ii./17,536. *Salvarsan topically* or *thorough irrigation with Iodine. Hydrogen Peroxide Gargle, Sod. Perborate Paint and Wash, Trichloracetic Acid* said to be specific.

Voice, Loss of.—Cocaine, C.L.O. Emulsion, Formosyl, Lichenoids, Pastils, Menthol, Ozonic Inhaler, Pot. Permang. Solube, or Solube Phenol, dissolved as gargle, Pot. Chlor. and Borax, Rhatany, Solube Borax Co. Throat Pastilli (Glycogelatin, *q.v.*), Tab. Formalin (to suck).

Amyl Nitrite and other Vasodilators in hysterical aphonia.—*Vide* Amyl Nit.

Vomiting.—Acetanilide, Arsenic, Acid. Carbolic, Acid. Hydrocyanic. Dil., Ammon. Bromid., Beef Essence (Brand's), Bisedia, Bismuth preps., Calcii Chlorid., Calcis Aqua, Chloral, Chloroform preps., Coca and Cocaina, Cremor Magnes., Elixir Gentianæ Acidum, Hydrog. Perox., Iodi Tinct., Magnes. Carb., Morphin. hypod., Nitroglycerin., Nux Vomica, Pot. Bicarb. c. Acid. Citric Mist., Efferves., Sedeff, Sodii Phosph. Eff., Vin. Ipec. in minim doses, N. Saline per rectum. Of infancy, Sod. Bicarb. ; of Pregnancy, *see* **Pregnancy.**

Vomiting, Post Operative.—Adrenalin *per os*, Chloretone, Cocaine subcut. See also Vomiting if patient able to take internally. For vomiting after Chloroform—a few drops of Chloroform on Sugar.

Vomiting, Cyclic or Recurrent.—Glucose Injection, Rectal Feeding. Sod. Bicarb. 1 dr. in N. Saline intrav.

Warts and Corns.—Lime Water internally.

Locally.—Ac. Acetic Glac., Ac. Carbol., Ac. Nitric, Ac. Chromic., Ac. Picric, Ac. Trichloracetic, Arg. Nit., Carbonic Acid Snow, Collodium Callosum, Collod. Salicyl., Collod. Salicyl. c. Ac. Lactic, Formalin, Glyc. Papain, Hydrarg. Nitras, Ol. Cinnam., Iodi Linim., Liq. Arsenicalis, Paraform Collod., Potassæ Liquor, Radium, Liquor Sodii Ethylat., Magnesium, and Zinc Ions, 'X' rays.

Calcium Carbonate or Phosphate 2 parts, Hydrous Wool Fat 3 parts, applied over a period of 4 to 6 weeks, is said to have been effective.

Water Purification.— Chlorination, Copper, Iodine, Permanganates, Potassium Iodate, Sodium Persulphate and Acid Sulphate.

Wax in the Ears.—Ol. Amygd. then syringe or Hyd. Perox. or diluted c. equal vol. of Glycerin, syringing afterwards, Glyc. and Sod. Bic. Saturated Solution.

Whitlow.—Hydrog. Perox., Mang. Butyrate.

Whites.—*See* **Leucorrhœa.**

Whooping-cough (Pertussis).—Ac. Benzoic and Benzoates, Ac. Carbolic Ac. Hydrocyan. Dil., Adrenalin, Allii Succus, Alumen, Amyl Nitris, Apomorphine (minute doses), Atropine, Atropine Methyl Bromide, Belladonna (almost specific), Benzol, Bromides, Bromoform Ether injection into the buttock (children under 1 year 1 Cc.), Bryonia, Caffeine Tri-iodide Pil. (Billimoria), Calcis Aqua, Calc. Sulphid., Benzyl Benzoate, Camphor Elixir, Camphora Monobrom., Chloral, Cocaine HCl. (*on the basis of one grain thrice daily for an adult*), Codeine Jelly, Conium, Gelsemium, Glycaphorm, Grindelia, Hexamine, Iodine in small doses, Ipecac., Lobelia, Morphine, Ol. Succini, Oxygen inhalation, and with Alcohol, Ozonic Ether, Papaverine, Phenacetin, Phenazonum, Pot. Brom., Quinine, Senega, Sodii Benzoas, Stramonium, Syrup Thymi, and Ext. Liq., Syr. Pini Terp. Heroin, Tab. Formalin (to suck), Vaccines, Thymaglycin, 10 m. doses for children diluted useful.

Argent. Nit. 2% *as Pigment, Ethyl Iodide Inhaled, Oxygen subcutaneously* (L. i./27,89), *Pigment Cocaine et Hyd. Perchlor., Succini Ol. as Liniment, Vapor Coninæ, Fumigate room with Tricresol or Sulphurous Acid, Resorcin as Nebula, Trichloracetic Acid, Vapor and Liniment Terebeni., 'X' Rays.*

Croton Oil 1 ounce, Cantharidin 3 grains, Strong Acetic Acid 1 drachm, Almond Oil to 8 ounces painted weekly back and front for whooping cough. Aborts within 14 days.—W. J. Midelton.

Full doses of Carbolic Acid, Belladonna and Ipecac. with 1 m. a day for each year of child's age of Adrenalin Solution.—B.M.J. ii./21,224.

A mixed vaccine usually beneficial. Small dose of Belladonna, Bromide, and, if severe, Morphine and Antipyrin. In later stages, where there is no bronchitis, Benzyl Benzoate.—T. Izod Bennett, L. i./23,198.

Even in small infants large doses of Vaccine. Favourable results.—L. ii./30, 1304.

Worms (Intestinal) :—

Ankylostoma Duodenale (*Hookworm*). *See Ankylostomiasis.*

Ascarides (Threadworms).—Acid Carbolic 2 grains ½ hour *ante cib.* and Ung. Hyd. to rectum for a few nights. Alum. Subacet., Carbon Tetrachlor., Chenopodium Oil, Enemata Aloes, Sodium Chloride, Salicylic Acid, Thymaglycin, Thymol or Quassia, Quassia, Suppositories. Filix Mas has cured. Methyl Aspriodine should be tried internally.

Chloroform 3 to 4 Gm. kills the parent organisms and prevents development of ova. May well be combined with *Castor Oil* or Olive Oil. Effective against ascarides, as also against *Ankylostoma, Oxiurides,* and *Tricocephalus.*

Acute ascariasis associated with trichuris trichiuria (*whip worm*). Santonin and Salol effectual.—C. Russell Corfield and B. Hirson, L. i./22,995.

Ascaris lumbricoides infection and Strongyloidosis treated with Santonin or Oil of Chenopodium.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

Bismuth Carbonate, as suggested by Loeper, a specific. For an adult 3 doses of 20 grains, at intervals of 4 hours, and for a child under 7 years 10 to 40 grains per dose. Simple and instantaneous cure.—G. Simpson, B.M.J. ii./29,604. Correspondence on treatment.—B.M.J. ii./31,517.

Lumbrici (Round Worms).—Areca, Calomel, Chenopodium, Jalap, Naphthalene, Santonin (with garlic draught), Spigelia, Conf. Santonin Comp., Turpentine.

Tænia (Tapeworm).—Calomel, Cousso, Filicin, Filix Mas, Kamala, Oleum Terebinth c. Ol. Ricini, Pelletierine, Pepo, Thymol, Terebene.

Trichuris trichiuria effectively treated with Thymol or Oil of Chenopodium. —N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

Many of the above drugs may be prescribed as *Stearettes* or *Formagules, q.v.* Colonic lavage with Dimol.

Wounds.—*Allantoin, Aseptafilm* (*applied as covering*), *Brilliant Green, Chloramine-T, Collodions, Cyanide Paste, Dakin's Solution, Glycerin and Glucose* (*combined*), *Glucose Powdered, Eusol, Formalised Gelatin, Hydrogen Peroxide, Iodine Tincture, Kelly's Paint, Liq. Alum Acet., Mastiche Benzol, Metaphen, Petrolatum Iodi, Mercuric Chloride or Biniodide Lotion, e.g. from a "Solube" 1 in 2,000 Mercurome.—Bandages, Gauzes, Lints, Wools medicated with Boric Acid, Carbolic Acid, Iodoform, Mercuric Iodide, Mercuro-Zinc Cyanide, Picric Acid, Thymol Iodide, etc.*

See also Antiseptics. For *Skin Sterilisation.*—See Iodum, p. 511, and Sublimate, pp. 468, 470, Mercurome, p. 480.

For the 10 years prior to 1925 Sir J. Bland Sutton said he had abandoned dressing dry wounds. Where drainage is unnecessary, dressings are unnecessary. Once daily the line of incision and the sutures are ***smeared lightly with Tincture of Iodine*** or similar antiseptic and ***left exposed to air,*** or merely in contact with clean underclothes. The wound heals rapidly, safely and soundly, with minimum discomfort and minimum expense.—B.M.J. ii./25,826.

Wounds in War.—We dealt fully with this matter in the Seventeenth Edn., p. 1015, *et seq.* The salient points are now incorporated in the body of the book.

"Back to Lister."—A discourse on antiseptic surgery.—Sir Rickman R. Godlee, B.M.J. i./15,515. LISTER'S STRONG ANTISEPTIC MIXTURE consisted of Carbolic Lotion 1 in 20 containing 1/500th part of Corrosive Sublimate. Employed successfully for washing out recesses of wounds.—Arthur Edmunds.

HYDRARGYRI ET ZINCI CYANIDUM. CYANIDE GAUZE.

'Quite good for visible clean wounds.'—A. Don, B.M.J. i./16,648.

Dry Cyanide Gauze also found excellent for 'suppurating abrasions, boils and skin affections.'

IODINE. Wounds in naval warfare are frequently septic owing to the circumstances. In the 'Tiger,' routine practice was first to wash with soap and water. After removing all foreign matter to dehydrate by flooding with S.V.M. and then sponge with 10% dilution of Tincture of Iodine in Methylated Spirit and insert drainage tubes and then cover with gauze.—B.M.J. ii./16,598. Some say it is irritating, and that the pain continues for some time, but we do not think this is generally acknowledged.

Wounds which are to heal by granulation, Quinine-Urea Hydrochloride 1 in 600 should be liberally injected as a prophylactic against pain.—R. E. Farr, L. ii./29,1199.

Yaws.—Arsenobenzol, Novarsenobenzol, Salfarsenol, and Silver Salvarsan. Bismuth Compounds injected. Bismuth Oxychlor. Ung.

Sodium Bicarbonate in 1 drachm doses together with Copper Sulphate locally. Potassium Iodide 10 to 20 grains for adults, 2 to 5 grains for children thrice daily. If anæmic Ammonio-Citrate of Iron. *Locally.*—Mercuric Nitrate Ointment (1 in 3 Soft Paraffin).

See also Frambœsia.

Yellow Fever.—Serum of Convalescent Patients tried. *See* Vol. II.

Zoster.—*See* Herpes.

ANTIDOTES TO POISONS.

Fuller information regarding many of the following is provided in the body of the book.

Acetanilide.—*Emetics. Inhalation of Ether and Oxygen.—Stimulants, e.g., Brandy, Coffee, Strychnine.*

Acetylene.—*As* **Carbon Monoxide.**

Acid Carbolic.—Saccharated Lime Water is best from the chemical standpoint. *Magnesium Sulphate or Sodium Sulphate (latter in preference) ½ oz. in ½ pint or more of warm water is wrong theoretically. Soft stomach tube with utmost caution. Apomorphine as emetic, but it does not always 'act.' Egg White, Stimulants, Oil, Weak Iodine Tincture, within limits give same quantity of Tincture of Iodine as of Liquid Phenol taken, Saline transfusion.* *See p.* 14.

Sulphates, e.g., Magnesium Sulphate, render inert all Carbolic Acid with which they come in contact. Till Sulphates in the body are overcome the Carbolic group cannot act on the tissues.—E. B. Leech, L. i./27,453.

Acid Carbolic Burns on Skin, *see* **Burns** Therap. Index.

Acid Cresylic, *see* **Acid Carbolic.**

Acid Hydrochlor.—*Alkalis, Chalk, Carron Oil, Lime Water.*

For acids squirted in the eye, douche well with weak Carbonate of Soda solution or 0·5% Caustic Potash and plenty of water. To prevent sepsis use Sublimate 1 in 6,000.—E. Clarke, Pr., July, '27,30.

Acid Hydrocyanic. ***Symptoms.***—*Giddiness, staggering, insensibility, eyes fixed and glistening, pupils dilated, violent gasping for breath, panting respiration. The poison is readily eliminated by the breath, so if life can be maintained for even half an hour recovery is probable. Inhalation is as dangerous as swallowing or even local application or dropping in the eye.*

If seen in time, stomach tube or emetic. Stimulants, Ammonia (inhale), Sal Volatile ad lib. If patient cannot swallow give brandy as enema or hypodermically. Alternate hot and cold douches, artificial respiration about 20 in the minute, Atropine hypodermically, or 30 drops of Tinct. Bellad. per os, repeated. Sod. Thiosulph. 10 Cc. 10 to 30% soln. intrav. See also Potassium Cyanide.

Acid Nitric.—*As* **Acid Hydrochlor.**

Acid Oxalic.—*The best is a mixture of Chalk (Whiting) and Saccharated Lime Water; subsequently stomach tube. Do not give Soda or other Alkali.—Barts. Apomorphine, Castor Oil.*

Acid Phosphoric.—*As* **Acid Hydrochlor.**

Acid Sulphuric.—*Magnesia and other alkalis (Lime), Carron Oil.*

Aconite.—*Apomorphine, Stimulants, Amyl Nitrite, Atropine Sulph.* $\frac{1}{50}$ *grain hypod. Digitalis Tincture, 20 minims hypod. Keep patient lying down.*

Aconite and Belladonna (*as Liniment*).—*Emetics, Stimulants freely—if not retained, dilute and give per rectum. Warmth.—Murrell.*

Æthyl Chlorid.—*Weak Ammonia Vapour. Hot flannels to heart. See also* p. 106, *or proceed as under Chloroform,* p. 283.

Alcoholism Acute.—*Empty stomach by syphon or stomach-pump or injection of* $\frac{1}{10}$ *grain apomorphine, wash out and fill with strong coffee, Amyl Nitrite Inhalation, heat to extremities, counter-irritation and injection of* $\frac{1}{10}$ *grain Strychnine.—Whitla. Powdered Charcoal ½ ounce in water is efficacious.*

Alcohol Methylic.—*As preceding.*

Alkalis Caustic.—*See* **Potash Caustic and Ammonia.**

Alkaloids.—*Emetics, Tannic Acid, Potass. Permanganate, Amyl Nitrite. See also alkaloid in question.*

Animal Charcoal, a tablespoonful or more in water, pumped out again and repeated. Afterwards rinse out with water containing the ordinary antidote, and then a suspension of Charcoal and Magnesium Sulphate if a purge is not contra-indicated.

Ammonia.—*Vinegar well diluted, Lemon or Orange Juice, Acetic Acid. Tracheotomy may be necessary. Bronchitis kettle, Morphine.*

Amygdalæ Amaræ Oleum Essentiale *vide* **Acid Hydrocyanic.**

Aniline.—*Emetics, artificial respiration, fresh air, oxygen, bleeding or transfusion.*

Aniline poisoning. Modus operandi.—Lempriere, B.M.J. ii./30,892; H. M. Roberts, ibid. 980.

Antifebrin.—*See* **Acetanilide.**

Antimony Compounds.—*Strong Tea or Tannin Solution* (30 *grains in warm*) *water). Repeat as often as vomiting occurs. When this subsides give white of egg in milk or water. Stimulants, Morphine when all symptoms subsided.*

Antipyrin.—*See* **Phenazone.**

Aqua Fortis.—*As* **Acid. Hydrochlor.**, *q.v.*

Arsenic.—*Emetics* (wash out stomach with warm water). *Antidotum Arsenici, p.* 174, *or if not ready, Liquor Ferri Dialysatus ad lib. or Magnesia ad lib.*

Aspirin.—*Swelling of face and tongue occurs very occasionally.—Sod.-Bicarb.*

Atropine.—*Emetics, stimulants with Morphine or Pilocarpine,* $\frac{1}{2}$ *grain repeated. (The latter is doubtful.) See also Alkaloids.*

Barbitonum.—*See* **Veronal.**

Barium Chloride.—*Emetics, Sodium Sulphate.*

Battery Fluids.—*See* **Acid Sulphuric.**

Battley's Solution.—*See* **Morphine.**

Belladonna.—*See* **Atropine.**

Benzol.—*Emetics, Artificial Respiration, Douche with alternately hot and cold water over chest from a height, Stimulants.*

Biniodide of Mercury.—*e.g., in Antiseptic Tablets taken in error.—See* **Hydrargyri et Potassii Iodidum.**

Blistering Fluids.—*As* **Cantharides.**

Bromine.—*See* **Chlorine.**

Butter of Antimony.—*Vide* **Antimony.**

Butyl-Chloral Hydrate.—*Emetics, Caffeine, Coffee, Atropine.*

Caffeine.—*Stomach tube, Emetics, Nitroglycerin, Apomorphine, Hypodermic Injection of Morphine* $\frac{1}{3}$ *grain with Atropine* $\frac{1}{50}$ *grain. See also* p. 245.

Calabar Bean.—*See* **Physostigma.**

Camphor (*and Camphorated Oil*).—*Emetics, Stimulants, Caffeine injection.*

Cannabis.—*Stomach tube, Emetics, Stimulants, Artificial respiration.*

Cantharides.—*If seen early, Stomach tube. Emetics. If mucous membrane much blistered give White of Egg in barley water or thick gruel—no fat.—Barts. Morphine if much pain.*

Carbolic Acid.—*See* **Acid Carbolic.**

Carbon Monoxide and Dioxide.—*Artif. respiration, Oxygen, Stimulants. In Carbon Monoxide poisoning, Glucose per os or subcut. or intrav.—Bleeding has been recommended in all cases unless contraindicated by the general condition.*

The quickest and most effective for Carbon Monoxide is ***Oxygen mixed with about 5% CO_2*** *through a mask, or make patient inhale as much as possible of expired air of another person.—Prof. J. S. Haldane, B.M.J. i./26,35 and B.M.J. ii./30,17 ; see also Y. Henderson, ibid. i./26,41–46.*

Carbon Dioxide relieves the symptoms before the gradual replacement of CO by O has taken place—probably a double action. The increased ventilation raises the oxygen tension in the alveolar air and the CO_2 stimulates the circulation. The latter has probably the greater immediate effect.—Prof. Haldane, L. ii./31,796.

The possible presence of Nitric-oxide-hæmoglobin must be considered in suspected cases of CO. poisoning. Boil a watery solution of the blood. If red colour and other chemical reactions or spectroscopic appearances are due to Nitric oxide-hæmoglobin, coagulum will be pink.—H. A. L. Banham, J. S. Haldane and T. Savage, B.M.J. ii./25,189.

Water Gas, Coal Gas, etc., recent data.—L. i./31,224.

Carbon Monoxide poisoning.—American Memorandum.—B.M.J. i./30,302.

Coal-gas poisoning deaths.—B.M.J. i./30,355.

Asphyxia from coal gas.—*The poisonous ingredient is the* **Carbon Monoxide,** *which is lighter than air. Artificial respiration. Keep patient warm. When conscious enough to swallow give hot coffee or tea—a few drops at first—with great care, to test ability to swallow. Hypodermic injections of Oxygen all over the body safe and efficacious, in addition to Oxygen inhaled. Stimulants, Strychnine, Camphor and Ether, do more harm than good. Do not dash cold water on patient.—D. A. Coles, L. ii./30, 1413.*

Coal gas poisoning might be treated with Hydrogen Peroxide, mixed with Normal Saline, intravenously.—Sir W. Willcox, B.M.J. ii./30,17.

Carbon Monoxide gas poisoning.—H. Hartridge, L. i./28,1137–40.

Coke stoves may be a source of danger by CO production.—Sir B. Spilsbury, B.M.J. ii./30, 17.

Modern treatments to eliminate the CO from the blood as quickly as possible. ***A mixture of 7% Carbon Dioxide and 93% Oxygen recommended****—successful in U.S.A.—R. Richards, B.M.J. ii./30,16.*

Carbon Monoxide poisoning. *Experiments by the author of the paper, including experiences in a steel chamber with various concentrations of the gas. Mental symptoms began when the hæmoglobin was 30 to 40% saturated, especially loss of memory of recent happenings. Carbon Monoxide poisoning may cause similar phenomena to Alcohol intoxication.—Prof. Haldane and Sir W. Willcox, B.M.J. ii./30,17.*

Caustic Potash, etc.—*See* **Potash.**

Chloral and Chloralamide.—*Keep patient awake, Strong Ammonia to nostrils, stomach tube or emetics at once followed by Amyl Nitrite, Coffee, Oxygen, Picrotoxin, Strychnine $\frac{1}{75}$ grain, repeated if necessary in $\frac{1}{2}$ hour. Artificial Respiration on slightest sign of failure continued some hours if necessary.*

Chloral and Morphine *(Combined).—Stomach pump or emetic. Arouse patient, but not to walk about. Ammonia to nostrils, cold then warm douche to head and chest. Atropine $\frac{1}{25}$ gr. hypod. repeated. Strychnine $\frac{1}{25}$ gr. hypod. if Chloral symptoms predominate.*

Chlorine and OTHER IRRITANT GASES.—

ALCOHOL *(Whisky, Brandy, etc.) to be inhaled from a cloth soaked with it as with Ether in addition. We have found this good.—W.H.M.* SODIUM BICARBONATE *about 10% solution inhaled through a respirator better than alcohol per os. Inhalation of Dilute* AMMONIA OXYGEN *subcutaneously into loose tissue.*

OXYGEN *inhalation by passing a tube connected with a gas cylinder to the back of patient's mouth and opening and shutting the tap about 15 to 16 times a minute, but it may only cause further irritation. For the cardiac weakness* CAMPHORATED OIL *subcut.* EMETICS *have proved useful.* $\frac{1}{2}$ *pint of* SALT AND WATER *or 8 grains of* COPPER SULPHATE *followed by large draughts of lukewarm water.* PILOCARPINE *should be injected to promote shedding of the epithelium—if this is not efficacious use* POTASSIUM IODIDE. *Simultaneously Morphine.—J. B. Berkart.* LIQUOR ATROP. SULPH. *9 minims, Water to 6 ounces. Dose.—*$\frac{1}{2}$ *ounce. Removes tightness across chest.* WARM AQUEOUS VAPOUR *is a good sedative. Subsequently ordinary methods of treatment of acute bronchitis.* SODIUM HYPOSULPHITE *in respirator solution.* VENESECTION *advised.—Sir E. Sharpey Schafer.*

Fumes from **Explosives** *in mines, accidents from.*

In all cases first produce emesis (APOMORPHINE HYPOD.), *then stimulants,* AMMONIA *or preferably* PITUITRIN.—*L. G. Irvine, B.M.J. i./16,162.*

Dichlor-ethyl-Sulphide (MUSTARD GAS, YPERITE), **Phosgene,** *and other gas poisonings.—B.M.J. ii./18,138.*

The first mentioned, though usually called a gas, is an oily liquid which rapidly soaks clothing and causes blisters difficult to heal. The effect is a delaying one, and is more marked on moist surfaces, e.g., from perspiration at the axillæ and fork. We had occasions during the war to make preparations to be used to counteract effects—an OINTMENT OF CHLORINATED LIME *seemed best. Iodine Picric Acid and others were tried.*

Use Sod. Bicarb. Sol. 1% for eyes.

A sulphur compound allied to Mustard Gas, which produces acute œdema of the lungs when injected intravenously.—B.M.J. i./23,819.

In treatment of the painful lesions apply any soothing application and inject 1% Manganese Butyrate 1 to 2 Cc. intram. on 3 occasions at 4 days' interval.—J. E. R. McDonagh, Brit. Jl. Derm. and Syph., Feb., 1924.

Nitrogen Peroxide *and other gases.—*SODIUM CARBONATE *20% solution. Mustard Gas caused 150,000 casualties in the British Army alone; under 4,000 (or 1 in 40) died, while about 700 were rendered permanently unfit. It is, however, one of the least lethal methods of putting an enemy out of action.—Review of Chemical Warfare, B.M.J. i./25,847.*

The late effects of poison gas.—L. i./26,1213.

Tear-Gas (Chloracetophenone).

Burns of skin should be promptly washed with a 50% Alcoholic solution of Sodium Sulphite, or Glycerin or Alcohol may be used; for the eyes, 0·4% Sodium Sulphite dissolved in 25 Cc. Water and 75 Cc. Glycerin.—W. D. McNally, Jl. A.M.A. i./32,46.

Diphenylchlorarsine, Diphenylaminechlorarsine, and Diphenylcyanarsine (three 'sneezing gases' contained in German 'Blue Cross' shells) react with Chlorine to produce non-irritant compounds, and inhalation of Chlorine rapidly relieves irritant symptoms. None of the therapeutic measures used during the war had more than a palliative effect.—D. C. Walton and W. A. Eldridge, Jl. Ph. & Exp. Ther., Mar. '29,256.

Bromine.—*We have found both dilute NH_3 and Alcohol Inhalation good. Treatment: with animal expts.* STRAMONIUM *fumes good.—W. L. Symes, B.M.J. ii./15,12.*

Chlorodyne.—*As* **Morphine,** *q.v.*

Chloroform Inhalation.—*Amyl Nitrite, Artificial respiration—see* p. 283. *Inversion of the body. Strych., Caffeine or Adrenalin Injections, the last into the heart or intravenously.*

Chloroform (*Swallowed*).—*Amyl Nitrite. Stomach tube or Emetic. Large draughts of water containing Sodium Carbonate, say 1 drachm in 1 pint. Lavage with warm oil, e.g., Olive, Almond, Sesame, then Saline transfusion.*

Coal Gas.—*As* **Carbon Monoxide.**

Cocaine.—*Stomach tube, Amyl Nit., Ether hypod. (5 min.). Strychnine hypod.*

Codeine.—*As* **Morphine,** *q.v.*

Colchicum.—*Evacuate the stomach, Demulcents, White of Egg, Stimulants.*

Colocynth.—*Spirit of Camphor, Laudanum, Stimulants, Strong Tea, Opium Enema.*

Condy's Fluid.—*See* **Pot. Permanganate.**

Conium.—*Stomach tube, Emetics, Tannin, Stimulants and Artificial respiration.*

Copper Salts.—*Stomach tube, Emetic, White of Egg, Milk, hot fomentations to stomach.*

Corrosive Sublimate.—*See* **Hydrargyrum.**

Creosote.—*As* **Acid Carbolic,** *q.v.*

Curare.—*Artificial respiration, Stimulants freely—see p.* 851.

Cyanides.—*See* **Acid Hydrocyanic and Potass. Cyanide.**

Dial.—*As* **Veronal.**

Digitalis.—*Emetics, Aconitine Nitrate $\frac{1}{120}$ grain hypod.—repeated in $\frac{1}{2}$ hour, or Atropine $\frac{1}{200}$ to $\frac{1}{100}$ grain hypodermically. Tannin, Camphor, Nitroglycerin, recumbent position.*

Dover's Powder.—*As* **Morphine,** *q.v.*

Emetics are:—*Ipecacuanha in powder 30 grains or $\frac{1}{2}$ to 1 oz. of wine. Apomorphine ($\frac{1}{10}$ to $\frac{1}{4}$ grain hypodermically), strong Salt solution (tepid), Olive oil, Copper sulphate (2 to 8 grains in water), Tartar Emetic ($\frac{1}{2}$ to 1 grain), Mustard 1 tablespoon in $\frac{1}{2}$ pint of water. Zinc Sulphate 30 grains in water.*

Ergot.—*Stomach Tube, Emetics, Purgation with Castor Oil or Mag. Sulph., Tannin, Stimulants, e.g., Amyl Nitrite, Nitroglycerin $\frac{1}{50}$ gr. Patient to lie down.*

Exalgin.—*As* **Acetanilide.**

Foxglove.—*See* **Digitalis.**

Fungi.—*A large proportion of deaths are due to Amanita phalloides, which peels like a common mushroom, but has bulbous part at base of stem, also yellowish green colour at edges and white gills; it grows beneath trees; the poison is a toxalbumin—Phallin, not an alkaloid. Stomach pump and Emetics (Ipecac. 25 grains or Salt Solution), Castor Oil, Atropine and Belladonna, Brandy, Spirit of Chloroform, Sal Volatile, Morphine for the pain, and administer normal Saline. Potassium Permanganate has been suggested to decompose any Phallin left in the stomach.*

On no account give Tartar Emetic where there is contraction of jaw muscles, or in the case of children. Apomorphine $\frac{1}{8}$ gr. (or $\frac{1}{20}$ grain or less for a child) may be preferable. Give any purgative (not senna or jalap). If delirium and convulsions set in ether or chloral may be necessary (the latter may also be given in Enemata). Finally for abdominal pain Morphine or opium, but always begin with an emetic.

Mushroom poisoning. Recurrence of symptoms after 8 months, though no mushrooms eaten in the interval.—Jl. Trop. Med., Mar. 15/23,94; Aug. 1/22,249.

Gases.—*See* **Chlorine** also **Carbon Monoxide, Nitrous Oxide.**

Gelsemium.—*Emetics, Atropine or Strychnine hypodermically, also Nitroglycerin or Amyl Nitrite. Artificial respiration, Stimulants.*

Heroin.—*See* **Morphine.**

Hydrargyrum (*Mercurial Salts*).—*Emetics, Apomorphine, White of one Egg for every 4 grains of Perchloride (avoid excess), then Stomach tube or Emetics, Reduced Iron, Alcohol or Ether for collapse. (Carron Oil made with Cod Liver Oil was given on one occasion where 43½ grains had been taken.)* Charcoal, *cf.* Alkaloids. See also pp. 454, 467.

Hydrarg. Potass. Iodide (*Biniodide Antiseptic Tablets taken in error*).—*Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts.*—See p. 464.

Hyoscine.—*Emetics, Pilocarpine Injection.*

Hyoscyamus.—*Vide* **Atropine.**

Hypnotics.—*Vide* **Drugs in question.**

Iodum.—*Stomach tube, Emetics (Apomorphine), Starch, Saccharated Lime Solution, or Sodium Hyposulphite, Demulcents—finally Opiates.*

Jaborandi.—*Atropine $\frac{1}{50}$ grain hypodermically or 30 minims of Tincture of Belladonna at once arrests symptoms.*

Laudanum.—*As* **Morphine,** *q.v.*

Lead.—*See* **Plumbum.**

Lime in the Eye.—*Put in Milk or Lard or Saturated Sugar Solution and douche the eye with 10% Neutral Ammonium Tartrate Solution. To prevent sepsis 1 in 6,000 Sublimate.—E. Clarke, Pr., July, '27,30.*

Luminal.—*See* **Veronal.**

Lunar Caustic.—*As* **Silver Nitrate.**

Lysol.—*See* **Acid Carbolic.**

Matches.—*As* **Phosphorus.**

Mercury.—*See* **Hydrargyrum.**

Monkshood.—*See* **Aconite.**

Morphine.—*Keep patient awake. Emetic first (Apomorphine $\frac{1}{10}$ grain,—vomiting is induced with difficulty), then stomach tube even if Morphine taken hypodermically. Wash out stomach with Potass. Permang. 10 grains in half a pint of Tepid Water (Morphine, even when given subcutaneously, is partly eliminated by the stomach lining). Saline Transfusion, Stimulants. Hot and cold Water poured on head alternately, drying in intervals. Ammonia to the nose, Strychnine, Atropine, $\frac{1}{20}$ grain hypodermically, or if not at hand 30 m. Belladonna Tincture for every grain of Morphine, artificial respiration or Oxygen if necessary. —Murrell. Carbo Animalis often repeated, cf. Alkaloids.*

Mushrooms.—*See* **Fungi.**

Mustard Gas.—*See* **Chlorine.**

Nepenthe.—*See* **Morphine.**

Nickel.—Purgation.

Nicotine.—*See* **Plants, Unidentified.**

Nightshade—*See* **Atropine.**

Nitrobenzol.—*See* **Oil of Mirbane.**

Nitroglycerin (*as used in blasting work*).—*Maintain recumbent position. Apply ice to the head, give Ergot per os or hypod.—Murrell.*

Nitrous Fumes.—*See* **Carbon Monoxide** and **Chlorine.**

Nitrous Oxide (*Dental*).—*Vide* page 142.

Novocain.—*As* **Cocaine.**

Nux Vomica.—*See* **Strychnine.**

Oil of Mirbane.—*Copper Sulph. (2 to 8 grains), or other Emetics, Stimulants, Atropine, Artificial Respiration, Calomel, Bismuth.*

Oil of Vitriol.—*See* **Acid Sulphuric.**

Opium.—*See* **Morphine.**

Paraffin (Paraffin Oil of Commerce).—*Stomach tube or Emetic.*

Paraldehyde.—*See* **Chloral.**

Paregoric.—*See* **Morphine.**

Paris Green.—*Charcoal, cf. Alkaloids and Arsenic.*

Petrol Poisoning.—*Fresh air and warmth, Camphor injections, Oxygen.*

Phenacetin.—*Stimulants: Brandy, Coffee, Strychnine.*

Phenazonum.—*Brandy, Ether, Strychnine, Oxygen.*

Phloroglucin.—*Charcoal, cf. Alkaloids.*

Phosgene.—*See* **Chlorine.**

Phosphorus.—*Oil of Turpentine has been recommended but not other oils, Potass. Permang. Solution 1% per os Murrell advises 3 grains Copper Sulphate every five minutes until vomiting is induced. To be continued 1 grain every fifteen minutes with a little Morphine if rejected. Epsom Salts as purgative. Charcoal, cf. Alkaloids.*

Oxidising agents, e.g., weak Hydrogen Peroxide, may be given.—E. B. Leech, L. i./27,453.

Physostigma.—*Emetics as Mustard, Zinc Sulphate, Apomorphine, Pot. Permang. by stomach tube, Atropine $\frac{1}{50}$ grain, or in bad cases Strychnine $\frac{1}{12}$ grain hypodermically, stimulants freely.*

Pilocarpine.—*See* **Jaborandi.**

Pit Gas.—*See* **Carbon Monoxide.**

Plants, Unidentified.—*Stomach tube, Emetics, Aperients, Treat symptoms, Artificial respiration.*

Plumbum.—*Emetics (Zinc Sulphate or Ipecacuanha), stomach tube, dilute Sulphuric Acid $\frac{1}{2}$ drachm in water; Magnes. or Sodium Sulph., Poultices to abdomen; Morphine hypodermic., for pain.* See also *Plumbum in text.*

Potassium Bichromate.—*Emetics, Mag. Carb., Barley Water, Arrowroot or thick Gruel and stimulants.*

Potash, Caustic.—*Dilute Vegetable Acid, Fixed Oils.* **Not** *stomach tube*

Potassium Chlorate.—*Stomach Tube, Emetics. Stimulants.*

Potassium Cyanide.—*Ferrous Sulphate Solution, large draughts, stomach tube, Emetics, Stimulants, Artificial respiration.*—See also **Acid Hydrocyanic.**

Martin's Antidote consists in formation in the gastro-intestine of Prussian Blue. Thus 30 Cc. of Ferrous Sulphate Solution 23% strength, 30 Cc. of Caustic Potash 5%, and 2 Gm. of Magnesia; the two former to be kept in sealed ampoules, to be mixed and taken immediately.—B.M.J. i./13,271.

Sod. Thiosulph., 10 Cc. 30% intrav.

Potassium Nitrate.—*Stomach tube or Emetics, Mucilaginous Drinks, White of Egg, Stimulants, Atropine if sign of heart failure.*

Potass. Permanganate.—*Lavage of Stomach, Warmth, Strychnine hypod.*

"Ptomaines."—*Finely powdered Charcoal is suggested as a suitable antidote after eating tainted or suspicious food (as under Fungi).*

Rat Paste.—*See* **Phosphorus** *or* **Arsenic.**

Red Precipitate.—*As* **Hydrarg.** *Give White of Egg freely followed by lavage of stomach.*

Salt of Sorrel *or* **of Lemons.**—*See* **Acid Oxalic.**

Savin.—*See* **Plants, Unidentified.**

Scopolamine.—*See* **Hyoscine.**

Sewer Gas.—*See* **Carbon Monoxide.**

Sheep Dip.—(?) **Arsenic.**

Silver Nitrate.—*Common Salt in demulcent drink (avoid excess), White of Egg, Milk.*

Stings, Wasp, Bee, etc.—*Ammonia or any Alkaline Solution.* See also *Therap. Index,* BITES AND STINGS.

Stramonium.—*See* **Atropine.**

Strophanthus.—*After evacuation by emetics and Stomach Tube, Tannin and stimulants. Anæsthetics to relieve spasm.*

Strychnine.—*Stomach Tube, Emetics, Potass. Permang., Chloral, Amyl Nitrite. Charcoal ad lib. Acid Tannic, Potass. Brom.* (½ *ounce in water with* 30 *grains of Chloral Hydrate). Patient may be kept fully under Chloroform or Ether. Artificial respiration if possible (most important). Saline transfusion.*

Sublimate.—*See* **Hydrargyrum.**

Sulphonal.—*Emetics, Stomach Tube, Strong Coffee, Strychnine, Artificial respiration. Patient to remain lying down.*

Sulphuretted Hydrogen. —*Iodised Starch* (5% *Iodine rubbed into Starch with a little water and dried).* Inhalation of Chlorine best.

Prolonged inhalation of Sulphuretted Hydrogen, even in as low a concentration as 100 *parts per million, is reputed to induce symptoms of chronic intoxication. Strictly speaking, it is an irritant gas.—Jl. A.M.A. ii.*/25,119; also *L. W. Smith and co-workers, ibid.* 177.

Tetrachlorethane.—*See Jaundice, Vol. II.*

Tobacco.—*See* **Plants, Unidentified.**

Trional.—*See* **Sulphonal.**

Turpentine.—*Empty stomach by pump or tube or give emetics—Apomorphine if necessary, Mag. Sulph., Demulcent Drinks.*

Verdigris.—*See* **Copper.**

Vermilion.—*See* **Hydrargyrum.**

Vermin Killer.—*As* **Strychnine** *or* **Arsenic,** *q.v.*

Veronal.—*Empty stomach by pump and enemata. Coffee, Strychnine, Artificial respiration, later diuretics.* See also *several recent abstracts of poisoning cases under Veronal.*

Weed Killer.—*See* **Arsenic.**

Weever *and other* **poison fish** *cause intolerable pain. Trawlers should have permanganate lancets on board, Chlorinated Lime, also Gold Chloride injections relieve pain.—M. Evans, B.M.J. ii.*/21,200.

White Precipitate.—*See* **Hydrarg.** *White of Egg freely.*

Zinc Salts.—NOT *stomach tube. Washing Soda. Milk and White of Egg Olive or any innocuous oil. Morphine.*

TREATMENT OF POISONING.—E. B. Leech, L. i./27,452.

Occupational diseases of ear, nose and throat, and their prevention. Anthrax, Lead poisoning, Mercury, Phosphorus, Nitrous fumes, Chlorine ulceration; compressed air illness, glanders.—F. H. Westmacott, B.M.J. ii./25,886.

Electric Shock *as from Live Electric Wire,* also *Lightning Shock and burns. Separate from live wire by catching hold of clothing or by using a good thick layer of cloth (dry) or a newspaper. If necessary cut a live wire with long iron scissors in wood handles. For burns Boric compresses. Raise the head. Artificial respiration.* See also *Vol. II., Radiology Chapter.*

Whether a shock is fatal or otherwise does not depend upon the voltage (pressure). The amount of current (amperes) which any pressure can force through a body and the path it takes determine whether fatal or not.

A rabbit generally survives 2,000 volts, not because it can stand a larger current through its body than any other animal, but because the skin of a rabbit offers such a high resistance that even 2,000 volts cannot force enough current through to kill it.

On the other hand 20 volts has killed a horse, whether it is the iron shoe held on by steel nails or the frog of the hoof, the fact remains that 20 volts can force enough current through the horse to kill, provided it enters and leaves at the hoofs, where the resistance is very low. Sometimes 200 volts will kill a man, while under other circumstances he would hardly feel it.—A. J. Abraham.

INTRAVENOUS DOSES.

The following are results of our experience, or have been collected from various authentic sources. Intravenous injections call for great care. The dose must be small, freely diluted, in isotonic solution and slowly injected.

The therapy in respect of some of the chemicals is entirely new and we should welcome suggestions from clinicians to extend the information.

Statements in some Medical Journals—especially foreign—as to the amounts of chemicals employed intravenously have sometimes amazed us. We have proceeded on the side of caution in giving limit doses.

We recommend trying half or even quarter doses or less at first, freely diluted, where the method is new.

The injection of foreign substances into the blood serum is in itself a risky business. Changes in blood pressure, collapse, shock and symptoms bordering on anaphylaxis may occur.—L. i./26,241.

Use a needle having a flat bevel with no shoulder and a sharp point, avoiding the drawn out point which may puncture the further side of the vein, or the lumen may fail to completely enter it.—H. Pritchard, B.M.J. i./27,792.

Every kind of intravenous injection except Normal Saline has at some time or other proved fatal—not to be embarked on lightly.—L. J. Witts, L. ii./30, 859.

Sterile solutions for injection. Intravenous injections to have no antiseptic. Pharmacopœia Revision recommendations.—P.J. ii./31,8. Indigo-Carmine advised to be autoclaved—*we do not*.—P.J. ii./31,9,49.

Intraperitoneal injection for certain drugs, Adrenalin, Pituitrin, Caffeine, Atropine, and Quinine, is stated to be more practical than intravenous injection, and should be used when both rapid and lasting effect is required.—W. H. Zeigler, Jl. A. Pharm. Assoc., Feb. '25,86 ; C. & D. i./25,462.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Acaciæ Gummi	16 Gm. (or more)	250 Cc. (or more in proportion).
Acriflavine, see **Euflavine**		
Adrenalin	0·5 Cc. of 1 in 1,000 solution	Usually added to 250 or 500 Cc. Normal Saline—to be given within 20 to 40 mins.
Amiodoxyl Benzoate	0·75 Gm. (?)	100 Cc. N. Saline.
Antimonii Oxidum	0·0006 Gm.—0·0012 Gm.	1 to 2 Cc. Glyc.+Aq.
Antimonium Tartaratum (Antim. Pot. Tart.)	0·03—0·1 Gm.	3—10 Cc.
Antimon. et Sod. Tart.	0·03—0·1 Gm.	3—10 Cc.
Antitoxins, *See* body of the work.		
Arsamin	0·01—0·05 Gm.	1 Cc.
Arsenobenzol	0·3 or 0·4 Gm.	300 Cc.
Bayer '205'	1 Gm. (?)	10 Cc.
Caffeinæ Sodio-Benz.	0·12 Gm.	5 Cc.
Calcii Chloridum	0·25 Gm.	5 Cc.
"Chaulmartin"	0·5—1 Cc.	
Choline Hydrochloride	0·6 Gm.	180 Cc.
Cocainæ HCl.	Enormous dose necessary—not suited for use.	
Colchicine	1/100 grain	Has been tried c. Sod. Iod. & Sod. Salicyl 1 Gm. each in 20 Cc.
Colloidal Copper (STRENGTH)	1 in 2,000	0·5—1 Cc.
Colloidal Gold (STRENGTH)	1 in 4,000	5 Cc.
Colloidal Mercury (STRENGTH)	1 in 2,000	5 Cc.
Colloidal Selenium (STRENGTH)	1 in 5,000	1 to 5 Cc.
Colloidal Silver (STRENGTH)	1 in 2,000	5 Cc.
Coramine	1 Cc.	Undiluted.
Digitalinum Pulv. Pvr.	0·0006 Gm. (1/100 grain)	10 Cc.
Digitoxin	0·00015 Gm. (1/400 grain)	10 Cc.
Emetinæ HCl.	0·03—0·04 Gm. (Rogers)	5 Cc.
Euflavine	0·25 Gm.	50 Cc.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Ephedrine HCl... ..	½ grain (?)	5 Cc.
Ether for Anæsthesia ...	5% in N. Saline	*v. p.* 99.
Eusol	50 Cc.	
Ferri Cacodylas ..	0·06 Gm.	5 Cc.
Gentian, Violet	0·2 Gm.	80 Cc.
Glucose	(in 5% solution)	500 Cc. or more.
Glycerin	4 Cc.	4 Cc.
Hexamine	1½ Gm. increased	10 Cc.
Hexamine with Sodium Iodide 1 Gm... ..	1·5 Gm.	20 Cc.
Hydrargyri Cyanidum..	0·012 Gm. (1/5 grain) Many (female) patients could stand twice the amount.—J. E. Lane, L. ii./21,796	1·2 Cc.
Hydrargyri Iodidum (c. **Sodii Iodid**, *q.s.*) ...	0·005 Gm. (Larger quantities in less	5 Cc. vol. have also been given)
Hydrargyri Oxycyanidum	0·005 Gm. (1/12 gr.) (0·012 Gm., *i.e.* 1/5 gr. has also be	5 Cc. in 1·2 Cc. (20 minims) en given).
Hydrargyri Perchloridum	0·002 (Gm. 1/32 grain) (Larger quantities in less	5 Cc. vol. have also been given)
Indigo Carmine ..	0·02 to 0·04 Gm.	10 Cc.
Iodi Tinctura Mitis (**Off.**)	1·2 to 2 Cc. (We suggest less to try)	10 Cc. N. Saline (Baillie, L. i./19,423).
Lobelin Ingelheim ..	0·003 Gm.	
Locke's Solution ..	500 Cc.	more or less
Magnesium Sulphate ..	1·0 Gm.	10 Cc.
Mannitol-Quinine ..	1 Cc.	20 Cc., but clinical data awaited.
Mercurome	0·05 Gm. (?)	10 Cc.
Morphine Salt	¼ to ½ grain	10 Cc.—Haynes, Pr. Sept. '31,379, *vide* also our p. 553.
Novarsenobenzol ..	0·6 Gm.	10 Cc.
	or	
Oleum Chaulmoograe ..	0·6 Gm. (*See* page 604), give Sod.	120 Cc. Chaulmoog. in preference.
Paraldehyde	5 to 15 Cc.	150 Cc.
Peptone	*Graded doses as follows*: 0·3, 0·5, 0·7, 0·9, 1·1, 1·3 Cc. and 4 doses of 1·5 Cc. (Further doses, 3 of 2 Cc., 3 of 2·5 Cc.)	5% Solution, neutralised (For asthma a 7½% Solution is given *intramusc.* *v. pp.* 663, 664.)
Peptone	8—10 Cc. increased by 2 Cc. every other day until 18—20 Cc. given	10% Solution, neutralised. (For septicæmia.)
Phenolsulphonephthalein	6 mgr.	2 Cc.
Quinidinæ Hydrochloridum Acidum ..	0·3 Gm. to 0·6 Gm.	5 to 10 Cc.
Quininæ Hydrobromidum Acidum ..	0·5 Gm.	10 Cc.
Quininæ Hydrochloridum Acidum ..	0·25 to 0·6 Gm.	10 to 20 Cc.
Quinine-Urethane ..	1 Cc. divided	For veins, see p. 735.
Ringer's Solution ..	500 Cc. (more or less)	
Saccharum	10·3% (isotonic)	
Sanocrysin	0·125 Gm. (?)	(?)

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Selenium.—*See* **Colloidal**		
Silver Salvarsan ..	0·1 Gm.	10 Cc.
Sodii Bicarbonas ..	Coma has been treated with a litre of 3 to 5% solutions in portions. 1·35% is isotonic.	
Sodii Bromidum ..	1 Gm.	10 Cc.
Sodii Cacodylas ..	0·05 Gm. (massive amounts, even 3 Gm. in 5 Cc. are mentioned.	1 Cc.
Sodii Chaulmoogras ..	0·03—0·06 Gm.	1 to 2 Cc.
Sodii Chloridum ..	0·9%	500 Cc. (more or less)
Sodii Cinnamas ..	0·1 Gm.	10 Cc.
Sodii Citras	0·4 Gm.	10 Cc. added to blood in transfusion.
Sodii Glycerophosphas	0·2 Gm. (increased)	5 Cc.
Sodii Iodidum	1 Gm. (Larger amounts in the same vol. are mentioned)	20 Cc.
Sodii Iodidum } .. **Sodii Salicylas** } ..	1 Gm. of each	20 Cc.
Sodii Morrhuas.. ..	0·06—0·12 Gm. (This to follow course of subcutaneous injections)	2 to 4 Cc. For varicose veins see p. 614.
Sodii Salicylas	1 Gm.	20 Cc. also 3 Cc. increased of 20 to 40% for varicose veins.
Sodii Thiosulphas (Hyposulphis).. ..	0·3 to 0·6 Gm.	5 Cc.
Strontii Salicyl	0·05 Gm.	10 Cc.
Strophanthin	¼ to 1 mgr.	10 Cc.
Sulfarsenol	0·06 Gm.	10 Cc. or more.
T.A.B. Vaccine	10-250 mills.	1 Cc.
Tryparsamide	3 Gm.	10 Cc.
Tylcalsin	0·5 to 1 Gm.	10 to 20 Cc.
Urea-Stibamine ..	0·1 Gm. incr.	2 Cc.
Vaccines & Sera ..	*See* Individual Items.	

PROPORTIONAL DOSE TABLE ACCORDING TO AGE (*Gaubius*).

For an adult suppose the dose to be	1 or 60 grains.
Under 1 year will require	$\frac{1}{12}$ „ 5 „
„ 2 „ „	$\frac{1}{8}$ „ 8 „
„ 3 „ „	$\frac{1}{6}$ „ 10 „
„ 4 „ „	$\frac{1}{4}$ „ 15 „
„ 7 „ „	$\frac{1}{3}$ „ 20 „
„ 14 „ „	$\frac{1}{2}$ „ 30 „
„ 20 „ „	$\frac{2}{3}$ „ 40 „
21 to 60, the full dose, or	1 „ 60 „

Above this age, an inverse gradation must be observed.

Young's Formula.—For children under 12, add 12 to the age, and divide the age by the amount thus obtained; thus for 8 years $\frac{8}{8+12} = \frac{2}{5}$ of adult dose.

Prof. W. J. Dilling says Young's and Gaubius' methods are of little value. The best formula after the 10th year is to multiply the adult dose by $\frac{\text{age} \times 5}{100}$ or by $\frac{\text{age.}}{20}$ This he found gave a curve which when plotted out coincides more closely than other systems with the curve obtained by plotting out the percentages of adult weight at ages obtained from birth to 21 years, which he considers is the average adult age. The new formula, he states, results in doses which correspond closely with those demanded.—B.M.J. ii./19,1177.

INDEX & POSOLOGICAL TABLE.

THIS index supplies the name *in Latin* as far as possible and adult dose (if used internally) of most of the drugs and preparations described. The doses are based on personal experience, or are culled from the best authorities.

For **Acids** look under the word **Acid.**

For **Salts,** *vide* **Latin name** of the **base.**

For **Effervescent Preparations,** see list under the word **Effervescent.**

Some items, *e.g.*, some ofthe Pilulæ have **purposely no page**—*i.e.*, they are not further described in the book.

Customary CONTRACTIONS have been found necessary, *e.g.* the following

Acid. or Ac. = Acidus,-a,-um, etc.
Alc. = Alcoholic.
Alk. = Alkalinus, etc.
Av. = Average (Dose).
Caps. = Capsula, etc.
C. = cum (with).
Co. = Compositus, etc. (or compound.
Conc. = Concentratus, etc.
Eff. = Effervescens, etc.
Emplast. = Emplastrum, etc.
Emuls. = Emulsio, etc.
Expt. = Expectorant.
Extr. = Extractum, etc.
Fluidextr. = Fluidextractum.
Glycerin = Glycerinum, etc.
Glyceroph. = Glycerophosphas, etc.
Gr. (in Index only) = grain (s).
HBr. = Hydrobromidum, etc.
HCl. = Hydrochloridum, etc.
Hyd. = Hydrargyrum, etc.
Hyp. = Hypodermicus, etc.
Inf. = Infusum, etc.
Inj. = Injectio, etc.
Incr. = Increased.
Linim. = Linimentum, etc.
Liq. = Liquor or Liquidus, etc.
M. = minim (s).
Mag. = Magnesium, etc.
Mang. = Manganesium, etc.
Mist. = Mistura, etc.
Potass. = Potassium, etc.
Quin. = Quinina, etc.
Rad. = Radix, etc.
Rep. = Repeated.
Salicyl. = Salicylas, etc.
Sol. = Solutio, etc.
Spirit. = Spiritus, etc.
Strych. = Strychnina, etc.
Syr. = Syrupus, etc.
Tinct. = Tinctura, etc.
Ung. = Unguentum, etc. or Ointment.
Vin. = Vinum, etc.
'85 = B.P. 1885.
'98 = B.P. 1898.
'14 = B.P. 1914.
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,, Diamorph. Camph., ½ to 1 dr.	... ...	560
,, Diamorphinæ et Terpin c. Apomorph, ½ to 1 dr.		560
,, Diamorph. c. Ipec, ½ to 1 dr.	... ...	560
,, Diamorph. et Scilla, ½ to 1 dr.	... ...	560
,, Diamorph. et Thym., ½ to 1 dr.	... ...	560
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,, ,, c. Lecithin, 1 to 2 dr.		577
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,, Quinidine, ½ oz....	...	715
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,, Rubrum, 20–60 m.	...	395
,, Saccharini, 5 to 20 m. ...		749
,, Secretogen, 1 to 2 dr. ...		950
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,, Symphyti, ½ to 2 dr. ...		888
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,, Thymi et Diaphorm, 1 dr.		560 890
,, Valerianæ et Bromidi,	½ oz.	820
,, Vanillin Co., ½ to 1 dr....		890
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,, ,, Gynocardri, ½ to 1dr.		302
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,, ,, c. Lecithin, 2 to 8 dr.		612
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,, ,, Paraffin c. Agar, ½ to	1 oz. ...	654
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,, -iodo-ricinoleate,	3 grains	619
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,, Gummi,	5·20 gr.	853
Eucalyptol,	1 to 4 m.	610 & V. II.
,, Chlorinated		47
,, Phosphate,	1 to 5 gr.	610 & V. II.
Eucodal		357
Eucerin		805
Euchlorine Gargle		766
Eucodeine,	¾ gr.	357
Eucortone		974
Eudoxin		679
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,,	Amps., 2 Cc.	799
,,	Suppos.	799
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,,	Aconiti Rad. Alc., max. ½ gr.	91
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,,	Agropyri Liq., 1 to 2 dr.	833
,,	Aletridis, Liq., 5 to 15 m.	834
,,	Alkanet	836
,,	Allii, 4 to 10 gr.	834
,,	Alni Glutinosæ Liq., 10 to 30 m.	835
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,,	Apocyni Liq., 15 m.	837
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,,	Bellad., Fol. av. ¼ gr.	219
,,	,, Liq., ⅓–1 m.	218
,,	,, Viride, ¼ to 1 gr.	219
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,,	Bone Marrow, 1–2 dr.	948
,,	Brain, 5 to 10 m.	949
,,	Buchu Liq., 30 m.	842
,,	Bynes (and Liq.), 1 to 4 dr.	541, 542
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,,	Cannabis Ind., ¼–1 gr.	264
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,,	Catha Solid., 2½ to 10 gr.	845
,,	,, Liq., 1 to 5 m.	845
,,	Caulophylli Liq., 8 m.	846
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,,	Cerevis. Ferment., 3 gr.	277 & V. II.
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,,	Chekan, Liq., ½–3 dr.	847
,,	Chelid. Liq., 10 to 30 m.	847
,,	Chenopodii Liq., ½ to 1 dr.	848
,,	Chinæ, 1 to 4 gr.	294
,,	Chiratæ Liq., 15 m.	848
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,,	Convallariæ, 2–8 gr.	850
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,,	Corn Silk, Liq., 1 dr.	865
,,	Coronilla, 1½ gr.	850
,,	Costus Liq., ½ to 2 dr.	850
,,	Coto Liq., 2 to 6 m.	375
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,, Ointment	... ...	476
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,, Carbonas	... ...	821, 824
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,, ,, Aniline	...	...V. II.
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,, et Hyd. Cyanid.	... ...	461
,, Gelatin	... ...	823
,, Ichthosulphol	... ...	497
,, Iodas	... ...	830
,, Iodidum, av. 1 gr.	...	822
,, Lactas, ½ to 3 gr.	...	822
,, Margosas	... ...	839
,, Oleas	... ...	600
,, Oleo-Stearas	... ...	600
,, Oxidum, 3 to 10 gr.	...	823
,, Oxychlor.	... ...	825
,, Oxyphosph.	... ...	825
,, Oxysulph.	... ...	825
,, Permang.	...548 & V. II.	
,, Peroxid.	... ...	490
,, Phenol-para-sulphonas	...	20
,, Phosphid., 1/20 to 1/3 gr.		682
,, et Potass. Cy., 1/10 to 1 gr.		822
,, Salicyl., 1 to 5 gr.	...	825
,, Silicas (=Willemite)		...V. II.
,, Stearas	... ...	600
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,, Sulphas., 1 to 3 gr. tonic, 10 to 30 gr. emetic, 825 ; Antiseptic Power, V. II. ; Spray in C.S. Fever	... ...	826

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,, Sulphocarbolas	... 20 &	V. II.
,, Sulpho-ichthyolat	...	497
,, Tannas ...	... ...	90
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NAME.	DOSE.	P
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CORRIGENDA.

p. 66, line 5, 'Varicose Ulcers' in bold type should be line 8.
p. 66, two thirds down. The note, 'Sod. Salicyl. not so certain in effect quinine' refers to Varicose Veins, and should be moved up.
p. 249.✱ Hervea is T.M. 421853, Class 3.
p. 344. Aminobenz. M.W. 167·0782.
p. 410. Evonymine Brune FR. CX., not Euonymine.
p. 453. For Crystazol read Cystazol.
p. 768, line 5, read Jodetum.
p. 851, line 17, Curara *vice* Cucara.
p. 853. Emblicæ Fructus is the fruit of *Phyllanthus emblica* (*Euphorbia* distinct from *T. Chebula*.
p. 875, 11 lines from bottom, plantain *vice* plaintain.
p. 1006. Dangerous Drugs Bill 1932, received Roy. Assent Mar. 24,'32, h read *Act*.

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